Government of Karnataka

DEPARTMENT OF SCHOOL EDUCATION AND LITERACY

DISTRICT INSTITUTE OF EDUCATION AND TRAINING
KOLAR

LEARNING BASED ASSESMENT QUESTION BANK

2025-26

MATHEMATICS

9

NINTH STANDARD

DEPARTMENT OF STATE EDUCATIONAL RESEARCH AND TRAINING ,

BANASHANKARI 3rd STAGE, BENAGALURU-560085

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</table>

INDEX

CHAPTER -1 NUMBER SYSTEM

Learning Outcomes:

- Recall natural numbers, whole numbers, integers and rational numbers in order to classify a given number as either of them.
- Represent a given number in the form of $\frac{p}{q}$ in order to show whether the given number is rational or not.
- Use Pythagoras theorem and create Pythagorean triplet in order to construct the length of root of a given number.
- Rationalize the denominator of a given expression with a square root term in the denominator in order to convert it to an equivalent expression whose denominator is a rational number.
- Extend the law of exponents in order to simplify a given expression.

TEACHING POINTS:

- Introduction to number system.
- Irrational numbers.
- Real numbers and their Decimal expansions.
- Representing Real numbers on the Number Line.
- Laws of Exponents for Real Numbers.

EASY	AVERAGE	DIFFICULT	TOTAL
21	29	04	54

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries One-mark)

1. A number 1.101001000….. is an example for (EASY)

A) Natural number B) Whole number

C) Rational number D) Irrational number

2. Every rational number is a (EASY)

A) Natural number B) Real number

C) Whole number D) Irrational number

3. Among the following the rational number is (EASY)

A) $\sqrt{25}$ B) π C) $1.232342345……..$ D) $\sqrt{3}$

4. Among the following an irrational number is (EASY)

A) $\sqrt{49}$ B) $\frac{4}{3}$ C) 5.478 D) $\sqrt{13}$

5. The decimal expansion of $\sqrt{2}$ is (AVERAGE)

A) 1.41414. . . . . B) 1.41421

C) non-terminating recurring D) non-terminating non-recurring

6. Between two rational numbers (AVERAGE)

A) There is no rational number.

B) There is exactly one rational number.

C) There are infinitely many rational numbers.

D) There is only one rational number and no irrational number.

7. The value of $\sqrt{6}X\sqrt{27}$ is (AVERAGE)

A) 162 B) $9\sqrt{2}$ C) $9\sqrt{3}$ D) $3\sqrt{2}$

8. $2\sqrt{3} + \sqrt{3}$is equal to (EASY)

A) $2\sqrt{6}$ B) $2\sqrt{3}$ C) $3\sqrt{3}$ D) $2\sqrt{9}$

9. The rationalising factor(R.F) of $\sqrt{5} + \sqrt{3}$is (EASY)

A) $\sqrt{5} - \sqrt{3}$ B) $\sqrt{5} + \sqrt{3}$ C) $\sqrt{3}$ D) $\sqrt{5}$

10. The rationalising factor(R.F) of $2 - 5\sqrt{7}$is (EASY)

A) $2 - 5\sqrt{7}$ B) $2 + 5\sqrt{7}$ C) $2 * 5\sqrt{7}$ D) $-3\sqrt{7}$

11. Rationalise the denominator of $\frac{1}{\sqrt{3}+\sqrt{2}}$ (AVERAGE)

A) 1 B) $\sqrt{3} + \sqrt{2}$ C) $\sqrt{3} - \sqrt{2}$ D) $\sqrt{5}$

12. Value of $\frac{\sqrt{32}+\sqrt{48}}{\sqrt{8}+\sqrt{12}}$ is (AVERAGE)

A) $\frac{\sqrt{80}}{\sqrt{20}}$ B) 2 C) 4 D) $\sqrt{2}$

13. The value of $(256)^{\frac{1}{4}}$ is (AVERAGE)

A) 16 B) 256 C) 4 D) 2

14. A number0.6666666…… can be expressed in the form of $\frac{p}{q}$ as (AVERAGE)

A) $0.\overline{6}$ B) $\frac{10}{3}$ C) $\frac{47}{7}$ D) $\frac{2}{3}$

15. The product of $\sqrt{3}+\sqrt{2}$ and $\sqrt{3}-\sqrt{2}$ is (AVERAGE)

A) $(3+2\sqrt{2})$ B) $((3-2\sqrt{2})$ C) 1 D) $9+4\sqrt{2}$

16. $m^3 \text{X}\, m^3$ can be expressed as (EASY)

A) m^6 B) m^9 C) m^1 D) m^0

17. The value of $\frac{10^5}{2^3 \text{x}\ 5^3}$ is (AVERAGE)

A) 10 B) 50 C) 100 D) 1000

18. $(ab)^{-2}$ can be expressed as (AVERAGE)

A) $\frac{1}{a^2b^2}$ B) $\frac{1}{a^{-2}b^{-2}}$ C) a^2b^2 D) $\frac{-2}{ab}$

19. The value of 1000^0 is (EASY)

A) 1000 B) 100 C) 10 D) 1

20. The value of$\{[(2)^2]^2\}^2$ is (AVERAGE)

A) 16 B) 64 C) 256 D) 512

II. Answer the following questions: (One-mark questions)

21. Define rational number. (EASY)

22. Define irrational number. (EASY)

23. Give an example for irrational number. (EASY)

24. Is zero a rational number?

Can you write it in the form $\frac{p}{q}$, where p and qare integers and q ≠ 0? (EASY)

25. Add: $2\sqrt{2} + 5\sqrt{3}$ and $\sqrt{2} - \sqrt{3}$ (EASY)

26. Multiply: $6\sqrt{5}$ by $2\sqrt{5}$ (EASY)

27. Divide: $8\sqrt{15}$ by $2\sqrt{3}$ (EASY)

28. Simplify: $(\sqrt{11} - \sqrt{7})(\sqrt{11} + \sqrt{7})$ (AVERAGE)

29. Simplify: $\left(\sqrt[3]{27}\right)^2$ (EASY)

30. Find the value of $\sqrt[3]{\sqrt{64}}$ (DIFFICULT)

31. Find the value of $64^{\frac{1}{2}}$ (EASY)

32. Find the value of $(32)^{\frac{2}{5}}$ (EASY)

III. Answer the following questions: (Two-marks questions)

33. Find 4 rational numbers between 1 and 2. (EASY)

34. Classify the following numbers as rational or irrational: (EASY)

(i) $\sqrt{23}$ (ii) $\sqrt{225}$

(iii) 1.101001000100001... (iv) 7.478478...

35. Express 0.333333……. in the form of $\frac{p}{q}$ (AVERAGE)

36. Express 0.99999……. in the form of $\frac{p}{q}$ (AVERAGE)

37. Express 0.121212……. in the form of $\frac{p}{q}$ (AVERAGE)

38. Express 2.123123123……. in the form of $\frac{p}{q}$ (AVERAGE)

39. Express $1.\overline{27}$ in the form of $\frac{p}{q}$ (AVERAGE)

40. Find the sum of $5\sqrt{x} + 7\sqrt{y}, 12\sqrt{x} - 9\sqrt{y}$ and $-8\sqrt{x} + 3\sqrt{y}$ (AVERAGE)

41. Evaluate $\sqrt{128} + \sqrt{50} - \sqrt{98}$ (DIFFICULT)

42. Find an irrational number between $\frac{1}{7}$ and $\frac{2}{7}$ (AVERAGE)

43. Simplify $\left(\sqrt{3}+\sqrt{7}\right)^2$ (AVERAGE)

44. Simplify $(3+\sqrt{3})(2+\sqrt{2})$ (AVERAGE)

IV. Answer the following questions: (Three-marks questions)

45. Locate $\sqrt{2}$ on the number line (AVERAGE)

46. Locate $\sqrt{3}$ on the number line (AVERAGE)

47. Locate $\sqrt{5}$ on the number line (DIFFICULT)

48. Find the value of:

    (i) $(9)^{\frac{3}{2}}$ (ii) $(125)^{\frac{2}{5}}$ (iii) $(16)^{\frac{3}{4}}$ (AVERAGE)

49. Rationalise the denominator and simplify: $\frac{1}{7+3\sqrt{2}}$ (AVERAGE)

50. Rationalise the denominator and simplify: $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$ (AVERAGE)

51. Write the following in decimal form and say what kind of decimal expansion each has : (i) $\frac{36}{100}$ (ii) $\frac{1}{11}$ (iii) $4\frac{1}{8}$ (AVERAGE)

V. Answer the following questions (Four-marks questions)

52. Represent $\sqrt{9.3}$ on the number line (DIFFICULT)

53. State whether the following statements are 'true' or 'false'. Give reasons for your answers.

    (i) Every natural number is a whole number. (AVERAGE)

    (ii) Every integer is a whole number.

    (iii) Every irrational number is a natural number.

    (iv) The square roots of all positive integers are irrational number.

V. Answer the following question (Five marks questions)

54. List all the laws of exponents. (AVERAGE)

CHAPTER – 2 POLYNOMIALS

Learning Outcome:

Identifies / classifies polynomials among algebraic expressions and factorises them by appropriate algebraic identities.

Teaching Points

- Meaning and types of a Polynomial
- Zeroes of a Polynomial
- Reminder Theorem
- Factorisation of a Polynomial
- Proving Identities

EASY	AVERAGE	DIFFICULT	TOTAL
28	30	08	66

I. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries one mark)

1. Among the following an example of polynomial is (EASY)

   A) $4x^2+2x-1$ B) $x^{-2}-1$ C) $y+\frac{2}{y}$ D) $5y+1=0$

2. The coefficient of x^2 in $9x^2+4x-6$ is (EASY)

   A) 2 B) 3 C) 6 D) 9

3. A polynomial of degree 1 is called (EASY)

   A) Linear polynomial B) Quadratic polynomial

   C) Monomial D) Binomial

4. A polynomial with degree 2 is called (EASY)

   A) Linear polynomial B) Quadratic polynomial

   C) Monomial D) Binomial

5. A polynomial with degree 3 is called (EASY)

   A) Linear polynomial B) Quadratic polynomial

   C) Cubic Polynomial D) Trinomial

6. $x + 2$ is an example of (EASY)

A) Constant polynomial B) Linear polynomial

C) Quadratic polynomial D) Cubic polynomial

7. $y^2 + 2y - 15$ is an example of (EASY)

A) Constant polynomial B) Linear polynomial

C) Quadratic polynomial D) Cubic polynomial

8. A polynomial in one variable with 3 terms is (AVERAGE)

A) $x^2 + 2x + 4$ B) $(3xy)$ C) $2x + 3y + 5z$ D) x^3

9. Among the following, the linear polynomial is (EASY)

A) $2x + 5$ B) $2x^2 + 5x + 6$

C) $3x^3 - bx^2 + 5x + 7$ D) $8x^{-2} + 6x + 4$

10. Among the following, the quadratic polynomial is (AVERAGE)

A) $ax + b$ B) $ax^2 + bx + c$

C) $ax^3 + bx^2 + cx + d$ D) $ax^{-2} + bx + c$

11. The degree of the polynomial $5x^7 + 2x^3 - 4x + 10$ is (EASY)

A) 2 B) 3 C) 5 D) 7

12. The degree of zero polynomial is (AVERAGE)

A) 0 B) 1 C) 2 D) 3

13. $\sqrt{10}$is a constant polynomial of degree ` ` (AVERAGE)

A) 0 B) 1 C) 2 D) 10

14. The zero of the polynomial$p(x) = -9x + 9$ is (EASY)

A) 0 B) -9 C) -1 D) 1

15. The zero of the polynomial$p(x) = x^2 - 1$ is (EASY)

A) 0 and 1 B) -2 and 1 C) -1and 1 D) 1 and 2

16. The value of the polynomial $7x^4 + 3x^2 - 4$, when x = - 2 is (EASY)

A) 100 B) 110 C) 120 D) 130

17. If $y^{97} + 97$ is divided by y + 1, the remainder is (AVERAGE)

A) 0 B) 1 C) 95 D) 96

18. $\frac{1}{2}$is the zero of polynomial (AVERAGE)

A) $(x - 4)$ B) $(x + 2)$ C) $(x + 4)$ D) $(2x - 1)$

19. The number of zeros of polynomial $x^2 + 4x + 3$ is (EASY)

A) 1 B) 2 C) 3 D) - 3

20. If 3 + 5 – 8 = 0, then the value of $(3)^3 + (5)^3 - (8)^3$ is (AVERAGE)

A) 260 B) –160 C) –360 D) 160

21. The value of 104 × 96 is (AVERAGE)

A) 9984 B) 9469 C) 10234 D) 11324

22. $(x + 2)$ and $(x + 3)$ are the factors of (AVERAGE)

A) $x^2 + 3x + 2$ B) $x^2 + 5x + 6$ C) $x^2 - 5x + 6$ D) $x^2 - 5x - 6$

23. The factors of $x^2 + 7x + 6$ are (AVERAGE)

A) $(x + 1)$ and $(x + 6)$ B) $(x + 3)$ and $(x + 2)$

C) $(x - 1)$ and $(x - 6)$ D) $(x - 3)$ and $(x - 2)$

24. If one of the factors of $x^2 + x - 20$ is $(x + 5)$ then the other factor is (AVERAGE)

A) $(x - 4)$ B) $(x + 2)$ C) $(x + 4)$ D) $(x - 5)$

25. In the polynomial $p(x) = ax^2 + bx + c$, if a=0, then it becomes (AVERAGE)

A) Quadratic polynomial B) Linear polynomial

C) Cubic polynomial D) Biquadratic polynomial

26. If $f(x) = x^2 - 2$, then the value of $f(0) + f(1)$ is (EASY)

A) 1 B) 2 C) 3 D) - 3

27. If $f(x) = x^2 - 2\sqrt{2}x + 5$ then the value of $f(\sqrt{2})$ is (AVERAGE)

A) 3 B) 7 C) 13 D) 11

28. If $x^2 + kx + 12 = (x + 4)(x + 3)$ then the value of k is (AVERAGE)

A) 3 B) 4 C) 7 D) 12

29. The difference of the zeroes of $f(x) = x^2 - 10x + 24$ is (DIFFICULT)

A) 2 B) -2 C) 5 D) 10

30. If (x+2) is a factor of $x^2 + mx + 14$ then the value of m is (DIFFICULT)

A) 2 B) 9 C) 7 D) - 9

II. Answer the following questions. (One mark questions)

31. Define Binomial. Give an example. (EASY)

32. Define linear polynomial. Give an example. (EASY)

33. Define quadratic polynomial. Give an example. (EASY)

34. Write the degree of zero polynomial. (EASY)

35. Find the product of $(m+n)$ and $(m-n)$ (EASY)

36. Write the factors of $x^2+(a+b)x+ab$ (AVERAGE)

37. Write the coefficient of x^2in $2-x^2+x^3$ (EASY)

38. Find the value of $p(x)=5x^2-3x+7$at x=1 (EASY)

39. Write the statement of Remainder theorem. (AVERAGE)

40. Is the zero of the zero polynomial exist? If yes write its zero (AVERAGE)

41. Find the zero of the polynomial$p(x)=cx+d$ (EASY)

42. Verify whether $x=\frac{4}{5}$is a zero of a polynomial$p(x)=5x-\pi$ (EASY)

43. Expand: $(2a-3b)^2$ (EASY)

44. If $m+n+p=0$ then find the value of $m^3+n^3+p^3$ (EASY)

III. Answer the following questions. (Two marks questions)

45. Give one example each of a binomial of degree 35, and of a monomial of degree 100.(EASY)

46. Check whether –2 and 2 are zeroes of the polynomial$p(x)=(x^2-2x)$ (EASY)

47. Examine whether $x+2$is a factor of x^3+3x^2+5x+6 (AVERAGE)

48. Factorise y^2-5y+6 by using the Factor Theorem (AVERAGE)

49. Find the value of k, if $(x-1)$ is a factor of $4x^3+3x^2-4x+k$ (AVERAGE)

50. By using suitable identity, find the product of$(x+4)$ and $(x+10)$ (AVERAGE)

51. Find the sum of $(x+y)^2$and$(x-y)^2$ (AVERAGE)

52. Factorise : $49a^2+70ab+25b^2$ (AVERAGE)

53. Evaluate 104^3using suitable identity. (AVERAGE)

54. Evaluate 105 X 106 using suitable identity. (AVERAGE)

55. Factorise $27y^3 + 125z^3$ (AVERAGE)

56. Expand $(3a + 4b + 5c)^2$by using suitable identity. (AVERAGE)

57. The length and breadth of a rectangular blackboard are $(x + 12)$ and $(x - 7)$. Find the area of the rectangular blackboard. (DIFFICULT)

IV. Answer the following questions: (Three marks questions)

58. Classify the following as linear, quadratic and cubic polynomials: (EASY)

(i) $x^2 + x$ (ii)$x - x^3$ (iii)$y^2 + y + 4$ (iv) $1 + x$ (v)$3t$ (vi) r^2 (vii) $7x^3$

59. If $x + y + z = 0$then prove that $x^3 + y^3 + z^3 = 3xyz$ (AVERAGE)

60. By using suitable identity factorise:$8x^3 + 27y^3 + 36x^2y + 54xy^2$ (AVERAGE)

61. The length, breadth and height of a cuboidal tank are$(x + 10), (x + 4)$ and$(x - 6)$. Find the volume of a cuboidal tank. (DIFFICULT)

V. Answer the following questions (Four marks questions)

62. Factorise: $x^3 - 23x^2 + 142x - 120$ (DIFFICULT)

63. Verify the following: (i)$x^3 + y^3 = (x + y)(x^2 + y^2 - xy)$ (DIFFICULT)

(ii) $x^3 - y^3 = (x - y)(x^2 + y^2 + xy)$

VI. Answer the following questions. (Five marks questions)

64. Prove that $x^3 + y^3 + z^3 - 3xyz = \frac{1}{2}(x + y + z)[(x - y)^2 + (y - z)^2 + (z - x)^2]$ (DIFFICULT)

65. Expand the following: (AVERAGE)

a) $(a + b)^2$

b) $(a - b)^2$

c) $(a + b + c)^2$

d) $(a + b)^3$

e) $(a - b)^3$

66. Write the factors for the following (AVERAGE)

a) $a^2 - b^2$

b) $a^3 + b^3$

c) $a^3 - b^3$

d) $a^3 + b^3 + c^3 - 3abc$

e) $a^4 + a^2b^2 + b^4$

CHAPTER – 3 CO-ORDINATE GEOMETRY

Learning outcomes:

1. Identify and describe the X-axis, Y-axis, origin and quadrants in the co-ordinate plane.
2. Accurately plot and read points on the coordinate plane.

Learning points:

1. Cartesian system.
2. Co-ordinates of a point.
3. Plotting points on the graph.

EASY	AVERAGE	DIFFICULT	TOTAL
15	15	04	34

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries one mark)

1. The coordinates of the origin is **(EASY)**

   A) (0, 1) B) (1.0) C) (0, 0) D) (1, 1)

2. The perpendicular distance of a point (4, 3) from y-axis is **(EASY)**

   A) 4 units B) 3 units C) 0 units D) 7units

3. Abscissa of a point is positive in **(EASY)**

   A) I and II quadrants B) I and IV quadrants

   C) I quadrant only D) II quadrant only

4. If y co-ordinate of a point is zero, then this point is always lies **(AVERAGE)**

   A) In I quadrant B) in II quadrant

   C) on x −axis D) on y −axis

5. A point both of whose coordinates are negative will lie in **(EASY)**

   A) I quadrant B) II quadrant

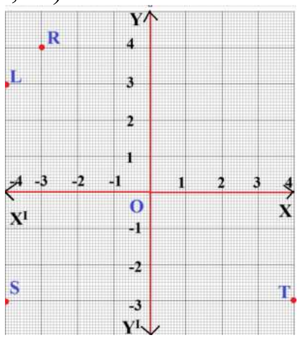
   C) III quadrant D) IV quadrant

6. The point at which the two coordinate axes meet is called the **(EASY)**

A) Abscissa B) Ordinate C) Origin D) quadrant

7. In the given graph the point whose coordinates are (-4, -3) is **(EASY)**

A) T B) R C) L D) S



8. The quadrant in which the point (-3, 2) lies is **(EASY)**

A) I B) III C) IV D) II

9. The point (0, 2) lies on **(EASY)**

A) x-axis B) Origin C) y-axis D) I quadrant

10. The sign of abscissa and ordinate of the point (x, y) in third quadrant is **(EASY)**

A) (-x, -y) B) (+x, +y) C) (-x, +y) D) (+x, -y)

11. On joining the points (0, 2), (2, 2), (2, 0) and (0, 0) in a graph we get a **(AVERAGE)**

A) Rectangle B) Square C) Rhombus D) Parallelogram

12. Ordinate of all the points on x-axis is **(AVERAGE)**

A) 1 B) -1 C) 2 D) 0

13. The point whose abscissa is 4 and which lies on x - axis is **(AVERAGE)**

A) (0 4) B) (4, 0) C) (4, 1) D) (1, 4)

14. Ordinate of a point is positive in **(EASY)**

A) I quadrant only B) II quadrant only

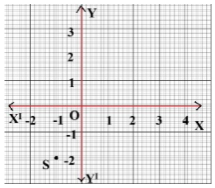
C) I and II quadrants D) II and IV quadrants

15. The perpendicular distance of a point (5, -2) from x-axis is **(AVERAGE)**

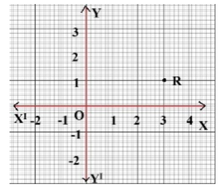
A) 5 units B) 0 units C) 3 units D) 2 units

16. The point which represent (4, -2) among the following is **(AVERAGE)**

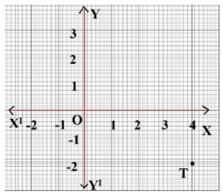
(A)



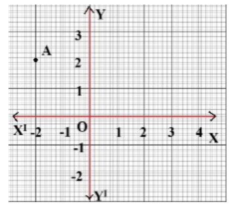
(B)



(C)



(D)



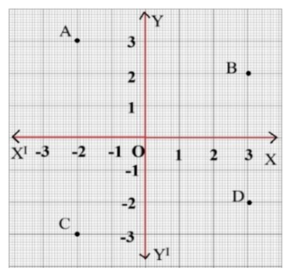
17. The co-ordinates of A, B, C and D are respectively **(AVERAGE)**

(A) (3,2), (-2,3), (-2,-3) and (3,-2)

(B) (3,-2), (-3,2), (-2,-3) and (3,-2)

(C) (-2,3), (3,2), (-2,3) and (-3,2)

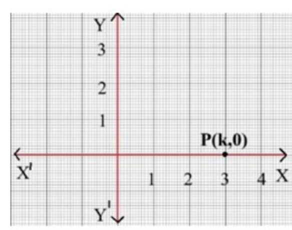
(D) (-2,3), (3,2), (-2,-3) and (3,-2)



18. In the graph, if $k = x + 1$, then the value of x is **(AVERAGE)**

(A) 0 (B) 2

(C) 3 (D) 4



II. Answer the following questions. (One mark questions)

19. Write the coordinates of a point lying on the x-axis at a distance of 4 units to the left of the origin. **(EASY)**

20. Write the quadrant in which the point (-4, -1) lie. **(EASY)**

21. What are the coordinates of a point which lies on both x -axis and y- axis? **(EASY)**

22. Mention the abscissa and ordinate of the point (6, -3). **(EASY)**

23. If x < 0 and y > 0 then write the quadrant of the point (x, y). **(AVERAGE)**

24. The point P lies 5 units above the x-axis and 3 units to the left of the y-axis, then write the coordinates of the point P. **(AVERAGE)**

25. If the x coordinate of a point is 0, then where does the point lie? **(EASY)**

26. Write the coordinates of a point that lies 7 units above the x - axis and 0 units from the y- axis. **(AVERAGE)**

III. Answer the following questions. (Two marks questions)

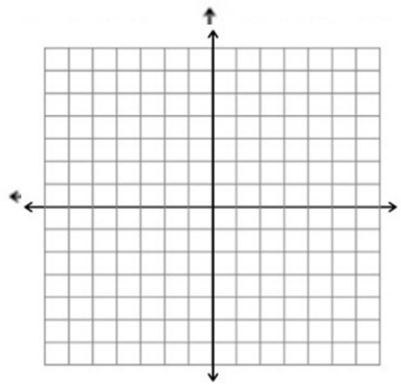
27. Name the following with respect to graph. **(AVERAGE)**

a) Horizontal line

b) Vertical line

c) The point of intersection of two axes

d) Each part of the plane divided by two axes



28. Write the quadrant or the axis on which do each of the points lie. **(AVERAGE)**

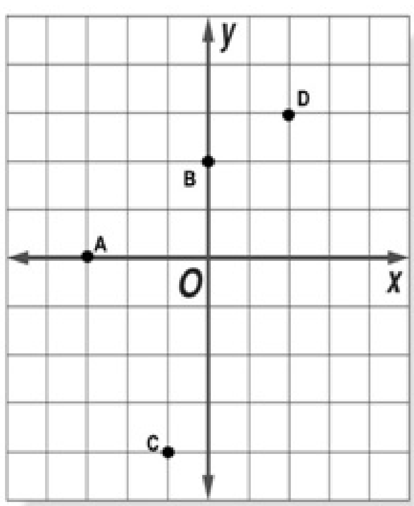
(-3, 5) (2, -2) (-3, 0) (-4, -6)

29. Write the coordinates of the following points**.** **(DIFFICULT)**

a) Lying on x-axis with x coordinate 5 b) Lying on y-axis with y coordinate -2

30. From the given graph, **(AVERAGE)**

Write the coordinates of the points A, B, C and D.



IV. Answer the following questions. (Three marks questions)

31. Plot the following points on the graph **(AVERAGE)**

	P	Q	R	S
x	0	2	-2	3
y	2	4	0	5

32. Draw the line passing through (2, 3) and (3, 2). Find the coordinates of the points at which this line intersects x-axis and y-axis. **(DIFFICULT)**

V. Answer the following question. (Four marks questions)

33. The coordinates of the three vertices of a square KLMN are K(-4, 2), L(3, 2), M(3, -5). Plot the points K, L, M on a graph. Complete the square and write the coordinates of N.

(DIFFICULT)

34. Represent the following situation in the graphical form and find the area of closed figure. A 9th standard student is started from his house located at the point (4,3), later he went to his friend home located at the point which is 4 units right from the origin and on the X-axis. After that both of them reached the school which is located at the origin.

(DIFFICULT)

CHAPTER – 4 LINEAR EQUATION IN TWO VARIABLES

Learning outcomes:

1. Identify and express linear equations in two variables in the standard form $ax + by + c = 0$.
2. Form linear equations in two variables from given real life situations.
3. Finds solution for the linear equations in two variables.

Learning points:

1. Standard form of linear equation in two variables.
2. Solution of a linear equation in two variables.

EASY	AVERAGE	DIFFICULT	TOTAL
13	13	02	28

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries one mark)

1. Standard form of linear equation in two variables x and y is (EASY)

A) $ax + by = 0$ B) $ax + by + c = 0$

C) $ax - by - c = 0$ D) $ax + by = 0$

2. The linear equation $2x - 5y = 7$ has (EASY)

A) A unique solution B) Two solutions

C) Infinitely many solutions D) No solution

3. The positive solution of the equation $ax + by + c = 0$ always lie in the (AVERAGE)

A) 1^{st} quadrant B) 2^{nd} quadrant

C) 3^{rd} quadrant D) 4^{th} quadrant

4. The solution of the equation $x - 2y = 4$ is (AVERAGE)

A) (0, 2) B) (2, 0) C) (1, 1) D) (4, 0)

5. If (3, 0) is the solution of the linear equation $2x + 3y = k$, then the value of k is

A) 6 B) 4 C) 5 D) 2

(EASY)

6. Any point on the line $y = x$ is of the form

A) (a, 0) B) (0, a) C) (a, a) D) (a, -a)

(EASY)

7. The linear equation having the solution $x = 5$ and $y = 2$ is

A) $5x + 2y = 7$ B) $x + 2y = 7$ C) $x + y = 7$ D) $5x + y = 7$

(EASY)

8. Which among the following is not a linear equation in two variables?

A) $ax + by = c$ B) $ax^2 + by = c$ C) $2x - 5 = 3y$ D) $2y - 6 = 3x$

(EASY)

9. The number of solutions for the linear equation in two variables is (EASY)

A) 1 B) 4 C) 2 D) Infinite

10. Solution of the linear equation $3x + 0y + 7 = 0$ is of the form (EASY)

A) $\left(\frac{-7}{3}, 3\right)$ B) $\left(4, \frac{-7}{3}\right)$ C) $\left(\frac{7}{3}, 0\right)$ D) $\left(0, \frac{-7}{3}\right)$

11. In a cricket match two batsmen together scored 181 runs. The linear equation form for the statement is (AVERAGE)

A) $x - y = 181$ B) $xy = 181$ C) $x + y = 181$ D) $\frac{x}{y} = 181$

II. Answer the following questions. (One mark questions)

12. "Twice the first number is added to the second number, the result is 8". Express the statement as a linear equation in two variables. (AVERAGE)
13. Is the equation $x + \frac{1}{Y} = 8$ a linear equation in two variables? (AVERAGE)
14. If $x = 0$ then, find the value of y in the equation $3x + 4y = 12$. (AVERAGE)
15. Find a solution for the equation $x + y = 5$. (AVERAGE)
16. $y = 3x - 7$ write this in standard form of linear equation in two variables. (EASY)
17. Find whether the point (2, -1) lies on the line $3x - y = 7$. (AVERAGE)
18. Write the equation of a line parallel to the x- axis. (AVERAGE)
19. The graph of a linear equation passes through the origin, Write its equation. (AVERAGE)
20. Represent the equation $5x = 2y + 2$ in the form of $ax + by + c = 0$. (EASY)

III. Answer the following questions. (Two marks questions)

21. Express $2x - 8 = 6y$ in standard form and write the values of a, b and c. (EASY)

22. Express 5x + 2y = 2 in the form $ax + by + c = 0$ and find the value of $a + b + c$. (AVERAGE)

23. If the point (3, 4) lies on the graph of the equation $3y = px + 7$, then find the value of p. (AVERAGE)

24. Find the value of k, if $x = 3$ and $y = 2$ is a solution of the equation $3x + 4y = k$.(EASY)

25. Find the points where the graph of the equation 4x+3y=12 intersects the x-axis and y-axis. (AVERAGE)

IV. Answer the following questions. (Three marks questions)

26. Verify which of the following are solutions of the equation $x + 2y = 6$ (AVERAGE)

    a) (1, 2) b) (2, 2) c) (0, 3)

27. A vehicle charges ₹25 for the first km and ₹15 each for every subsequent km travelled. If the distance travelled is 9 km, then find the total amount to be paid? (DIFFICULT)

V. Answer the following question. (Four marks questions)

28. Write any four solutions for the linear equation $3x + y - 12 = 0$. (DIFFICULT)

CHAPTER – 5 INTRODUCTION TO EUCLID'S GEOMETRY

Learning outcomes:

* Understand geometric concept such as point, line, ray, line segment and surfaces.
* Grasp differences between definitions, axioms and postulates.
* Apply these concepts to solve all basic problems involving lines, angles and plane figures.

Teaching points:

* Euclid's definitions.
* Axioms and postulates.
* Equivalent version of Euclid's fifth postulate

EASY	AVERAGE	DIFFICULT	TOTAL
25	08	03	36

I. **Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet.(Each question carries one marks)**

1. The mathematical statement which needs a proof is (EASY)

   (A)Theorem (B) Axiom (C) Definition (D) Postulate

2. Euclid belongs to the country (EASY)

   (A) Babylonia (B) Egypt (C) Greece (D) France

3. Things which are double of the same thing are (EASY)

   (A) Equal to one another (B) unequal

   (C) halves of the same thing (D) One is double of the other

4. Axioms are assumed (EASY)

   (A) Universal truths without the need for any proof.

   (B) Universal truths specific to geometry.

   (C) Theorems.

   (D) Definitions.

5. The three steps from solids to points are (AVERAGE)

(A) solids-surfaces-lines-points (B) solids-lines-surfaces-points

(C) lines-points-surfaces-solids (D) lines-surfaces-points-solids

6. Boundaries of solids are (EASY)

(A)Surfaces (B) curves (C) lines (D) points

7. Euclid divided his famous treatise "The elements" into (EASY)

(A) 13 chapters (B) 12 chapters (C) 11chapters (D) 9 chapters

8. The statement that do not satisfy Euclid's axiom is (AVERAGE)

(A)Things which are equal to the same thing are equal to one another

(B) If equals are added to equals, the wholes are equal

(C) If equals are subtracted from equals, the remainders are equal

(D) The whole is lesser than its part

9. The correct statement among the following is (AVERAGE)

(A) Only one line can pass through a single point

(B) There are an infinite number of lines that pass through two distinct points.

(C) A terminated line can be produced indefinitely on both sides

(D) If two circles are congruent, then their radii are unequal.

10. If $a = 6$ and $b = a$, then $b = 6$. This is an example for the axiom (EASY)

(A)Things which are equal to the same thing are equal to one another

(B) If equals are added to equals, the wholes are equal

(C) If equals are subtracted from equals, the remainders are equal

(D)The whole is lesser than the part

11. A pyramid is a solid figure, the base of which is (EASY)

(A) only a triangle (B) only a square (C) only a rectangle (D) any polygon

12. The side faces of a pyramid are (EASY)

(A) Triangles (B) Squares (C) Polygons (D) Trapeziums

13. In Indus Valley Civilisation (about 3000 B.C.), the bricks used for construction work were having dimensions in the ratio (EASY)

(A) 1 : 3 : 4 (B) 4 : 2 : 1 (C) 4 : 4 : 1 (D) 4 : 3 : 2

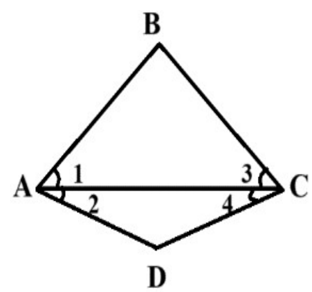
14. The number of dimensions, a point has (EASY)
(A) 0 (B) 1 (C) 2 (D) 3

II. Answer the following questions:(One mark questions)

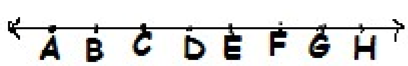
15. Write any one Euclid's postulate. (EASY)
16. Define a point based on Euclidian geometry. (EASY)
17. Define a ray. (EASY)
18. Write the significance of Euclid's fifth postulate. (AVERAGE)
19. Define a plane. (EASY)
20. Name the part of a line with two end points. (EASY)
21. Write the dimensions of a line. (EASY)
22. Define perpendicular lines. (EASY)
23. Write the name of the Euclid's famous book. (EASY)
24. How many common points can a pair of distinct lines can have? (EASY)

III. Answer the following questions. (Two marks questions)

25. Differentiate between axioms and postulates. (AVERAGE)
26. A and B have the exact weight. If they gain weight by 2kg in the given time, how will their new weights be compared? Justify your answer. (AVERAGE)
27. In the adjoining figure we have $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$. Show that $\angle A = \angle C$. (AVERAGE)



28. In the following figure, show that the length of AH > AB + BC + CD. (AVERAGE)

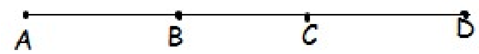


29. Define the following terms (EASY)
i) Perpendicular lines ii) A line segment
30. Define a) Collinear points b)Non-collinear points (EASY)

IV Answer the following questions: (Three marks questions)

31. If a point C lies between two points A and B such that AC=BC, then prove that AC = $\frac{1}{2}$ AB. Explain by drawing the figure. (DIFFICULT)

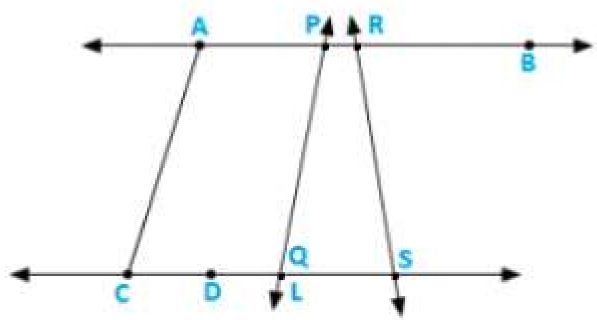
32. In figure, if AC=BD, then prove that AB=CD (DIFFICULT)



33. Write true or false for the following statement. Give reasons for your answers
    i) Only one line can pass through a single point.
    ii) There are an infinite number of lines which pass through two distinct points.
    iii) If two circles are congruent, then their radii are equal. (DIFFICULT)

V Answer the following questions: (Five marks questions)

34. Write any five axioms of Euclid's Geometry. (EASY)
35. Write any five postulates of Euclid's Geometry. (EASY)
36. In the below figure, name the following: (EASY)
    (i) any two line segments.
    (ii) any two rays.
    (iii) Four collinear points.
    (iv) one pairs of non–intersecting line segments.
    (v) parallel lines.



CHAPTER – 6 LINES AND ANGLES

Learning outcomes:

1. Learn to define and classify lines and angles.

2. Understand the properties of angles.

3. Apply the theorems related to angles to solve problems.

4. Explore pair of angles and their properties.

Teaching points:

1. Basic terms and definitions.

2. Intersecting lines and non-intersecting lines.

3. Pairs of angles.

4. Lines parallel to the same line.

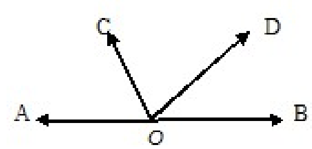
EASY	AVERAGE	DIFFICULT	TOTAL
29	19	17	65

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries one mark)

1. In the given figure, AOB is a straight line. If $\angle AOC + \angle BOD = 85^0$, then $\angle COD$ measures **(EASY)**

(A) 85^0 (B) 90^0

(C) 95^0 (D) 100^0



2. A pair of complementary angles such that one angle is half of another is **(EASY)**

(A) $50^0, 40^0$ (B) $120^0, 60^0$ (C) $55^0, 35^0$ (D) $60^0, 30^0$

3. Two adjacent angles on the same line are **(EASY)**

(A)Vertically opposite angles (B)complementary angles

(C)Linear pair angles (D) Reflex angle

4. When two lines intersect, then the correct statement is **(EASY)**

(A) Adjacent angles are always complementary

(B) Adjacent angles are always supplementary

(C) Opposite angles are always supplementary

(D) Opposite angles are always complementary

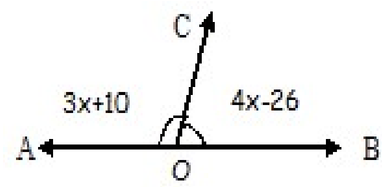
5. If two interior angles on the same side of a transversal which intersects two parallel lines are in the ratio 2:3, then the measure of the larger angle is **(AVERAGE)**

(A) 54^0 (B) 120^0 (C) 108^0 (D) 136^0

6. In the given figure, AOB is a straight line. If ∠AOC= $(3x + 10)^0$ and ∠BOC = $(4x – 26)^0$, then the measure of ∠BOC is **(AVERAGE)**

(A) 96^0 (B) 86^0

(C) 76^0 (D) 106^0



7. The statement which is not true among the following is **(EASY)**

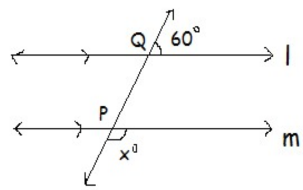
(A) Through a given point, only one straight line can be drawn.

(B) Through two given points, it is possible to draw one and only one straight line.

(C) Two straight lines can intersect only at one point.

(D) A line can be produced to any desired length.

8. The measure of 'x' in the given figure is **(EASY)**



(A) 60^0 (B) 90^0

(C) 120^0 (D) 64^0

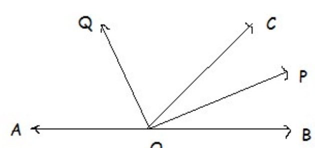
9. If a ray stands on a line, then the sum of two adjacent angles so formed is **(EASY)**

(A) 360^0 (B) 90^0 (C) 180^0 (D) 45^0

10. The angle between the bisectors of a linear pair of angles ∠AOC and∠BOC is **(EASY)**

(A) Right angle (B) Straight angle

(C) Reflex angle (D) Acute angle



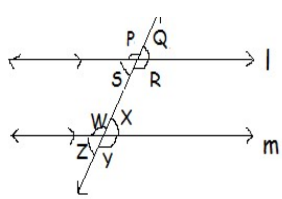
11. If two lines intersect each other, then the vertically opposite angles are always. **(EASY)**

(A) Equal (B) Supplementary (C) unequal (D) Complementary

12. An angle that measures 180^0 is called **(EASY)**

(A) Obtuse angle (B) straight angle (C) Right angle (D) Acute angle

13. In the adjoining figure the alternate angle of R is **(EASY)**



(A) W (B) X

(C) Y (D) Z

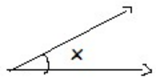
14. A ray that divides an angle into two equal angles is called **(EASY)**

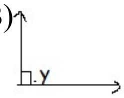
(A) Perpendicular bisector (B) Angular Bisector (C) Transversal (D) Vertex

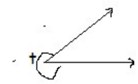
15. One of the following is an example for reflex angle **(EASY)**

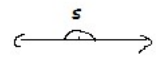
(A) 45^0 (B)120^0 (C)180^0 (D)270^0

16. The figure which represents straight angle is **(EASY)**

(A) 

(B) 

(C) 

(D) 

17. Number of right angles make a straight angle is **(EASY)**

(A) 1 (B) 2 (C) 3 (D) 4

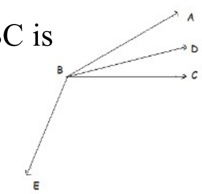
18. Number of right angles that constitute a complete angle is **(EASY)**

(A) 1 (B) 2 (C) 3 (D)4

19. Number of straight angles that make a complete angle is **(EASY)**

(A) 1 (B) 2 (C)3 (D)4

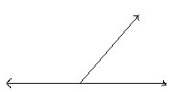
20. In the given figure, the common side for angles ∠ABD and ∠DBC is **(EASY)**

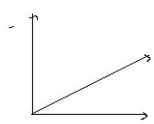


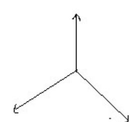
(A) AB (B) BD

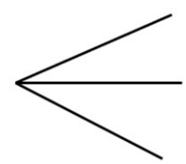
(C) BC (D) AE

21. Linear pair of angles among the following figures is **(EASY)**

(A) 

(B) 

(C) 

(D) 

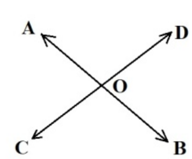
22. The complementary angle of 45^0 is **(EASY)**

(A) 45^0 (B) 30^0 (C) 90^0 (D) 60^0

23. The Supplementary angle of 120^0 is **(EASY)**

(A) 20^0 (B) 40^0 (C) 60^0 (D) 180^0

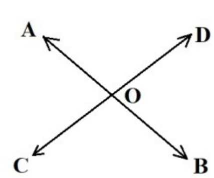
24. In the given figure one pair of vertically opposite angle is **(EASY)**



(A) ∠AOC=∠COB (B) ∠AOC=∠DOB

(C)∠AOD=∠AOC (D) ∠DOB=∠BOC

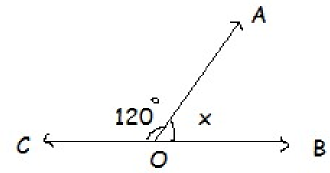
25. In the given figure one pair of adjacent angles is **(EASY)**



(A) ∠AOC and ∠COB (B)∠AOC and ∠DOB

(C)∠AOD and ∠BOC (D)∠DOB and ∠COA

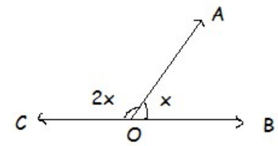
26. In the figure, the value of x is **(AVERAGE)**



(A) 40^0 (B) 60^0

(C) 80^0 (D) 100^0

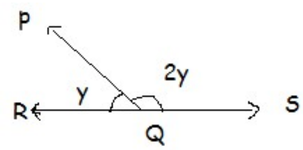
27. In the figure, the value of x is **(AVERAGE)**



(A) 20^0 (B) 30^0

(C) 45^0 (D) 60^0

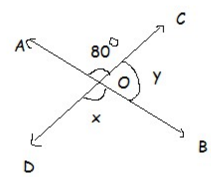
28. In the figure, the measure of ∠PQR is **(AVERAGE)**



(A) 30^0 (B) 45^0

(C) 120^0 (D) 60^0

29. In the figure, the sum of angles X and Y is **(AVERAGE)**



(A) 100^0 (B) 180^0

(C) 360^0 (D) 540^0

30. In ΔABC, if AB = AC and ∠BAC = 40^0, then the measure of ∠B is **(AVERAGE)**

(A) 60^0 (B) 70^0 (C) 100^0 (D) 180^0

31. The complementary angle of 65^0 **(AVERAGE)**

(A) 25^0 (B) 35^0 (C) 65^0 (D) 75^0

32. A part of line with two end points is called **(EASY)**

(A) Line segment (B) A ray (C) parallel lines (D) Intersecting lines

33. Reflex angle measures **(EASY)**

(A) More than 90^0 (B) Equal to 90^0

(C) More than 180^0 and Less than 360^0 (D) Equal to 180^0

34. Number of common points for two parallel lines are **(EASY)**

(A) One-point (B) Two points (C) Three points (D) Nill

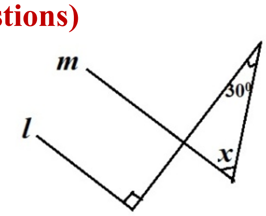
35. Angles of a triangle are in the ratio 5:3:7, then the triangle is **(AVERAGE)**

(A) A right triangle (B) An acute angle triangle

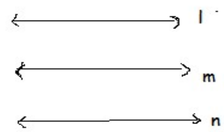
(C) An obtuse angle triangle (D) An isosceles angle

II. Answer the following questions (One mark questions)

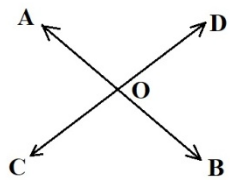
36. In the figure if l || m then find then measure of x. **(AVERAGE)**



37. In the given figure, what can you say about lines l and n, if l || m and m || n? **(AVERAGE)**



38. In the given figure if $\angle$ DOB= 60^0, then find the measure of $\angle$COA. **(AVERAGE)**

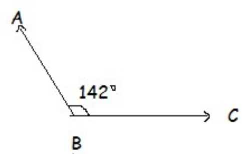


39. Two angles measure $(55^0 + 3a)$ and $(115^0 - 2a)$ if each angle is supplement of the other then calculate the value of a. **(AVERAGE)**

40. Define obtuse angle. **(EASY)**

41. Define collinear points. **(EASY)**

42. If $\angle$ABC = 142^0, find the measure of reflex $\angle$ABC. **(AVERAGE)**

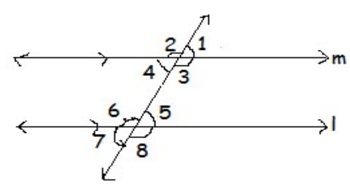


43. If one angle of a linear pair is 75^0, find the other. **(AVERAGE)**

44. "All supplementary angles form a linear pair "Is it true? **(EASY)**

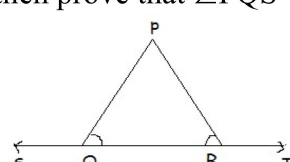
III. Short answer type questions: (Two marks questions)

45. In the figure, if $\angle 2 = 130^0$ and $\angle 5 = 50^0$, Find whether m||n and give reason for your answer.



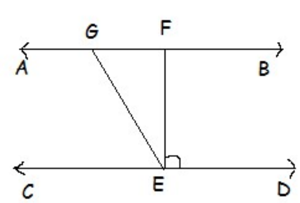
(AVERAGE)

46. In the figure,$\angle$PQR=$\angle$PRQ, then prove that $\angle$PQS=$\angle$PRT. **(AVERAGE)**

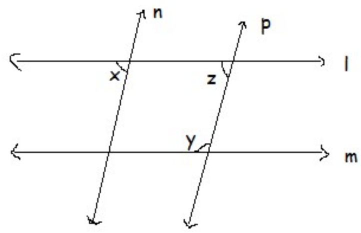


47. In the figure, if AB||CD, EF||CD and $\angle$GED = 126^0, then find the measure of $\angle$GED.

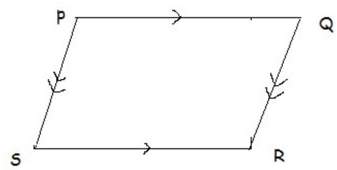
(DIFFICULT)



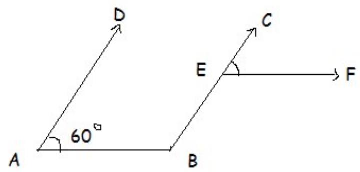
48. In the figure, $l||m$ and $n||p,$ if ∠X = 85^0, then find the measure of∠Y. **(DIFFICULT)**



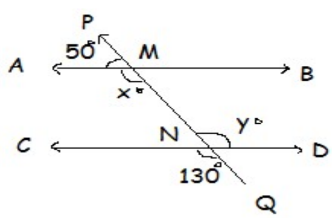
49. In the figure $PQ||SR$ and $PS||QR$. Prove that ∠SPQ=∠SRQ **(DIFFICULT)**



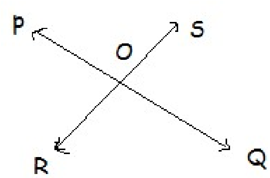
50. In the figure AD || BC and EF || AB, ∠DAB=60^0, then find the measure of ∠CEF. **(DIFFICULT)**



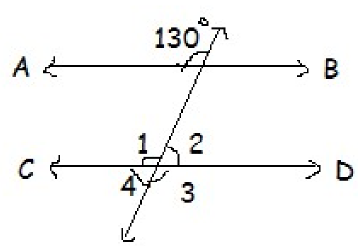
51. In the given figure if $AB||CD$, then find the measures of x and y **(DIFFICULT)**



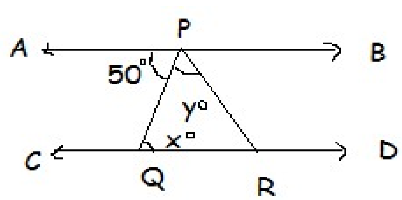
52. In the figure lines PQ & RS intersect each other at point O. If ∠ POR:∠ROQ=5 : 7, then find the measure all the angles. **(DIFFICULT)**



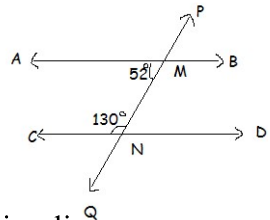
53. In the given figure, if $AB||CD$, then find the measures of ∠ 1, ∠ 2, ∠3 &∠4. **(DIFFICULT)**



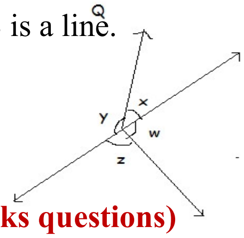
54. In the figure, if $AB||CD$, ∠ APQ =50^0 and ∠PRD=127^0, then find the measures of x and y. **(DIFFICULT)**



55. In the figure, is AB || CD? Justify your answer. **(DIFFICULT)**

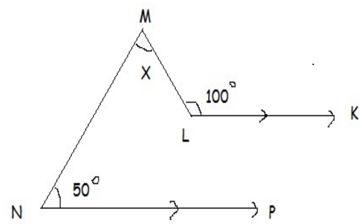


56. In fig if X + Y = W + Z then, prove that AOB is a line. **(DIFFICULT)**



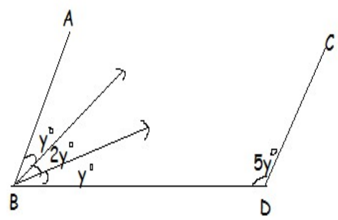
IV. Answer the following questions: (Three marks questions)

57. In the given figure, $LK||NP$, if ∠MLK=100^0 and ∠MNP=50^0, then find the measure of 'x'. **(DIFFICULT)**



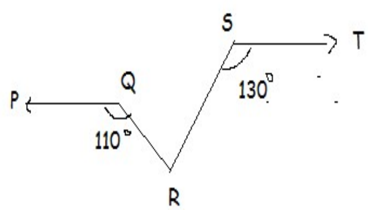
58. Prove that, "the lines which are parallel to the same line are parallel to each other". **(AVERAGE)**

59. In the figure, if a line segment AB is parallel to the line segment CD, what is the measure of 'y' and ∠CDB? **(DIFFICULT)**



60. Prove that, "if two lines intersect each other, then the vertically opposite angles are equal" **(AVERAGE)**

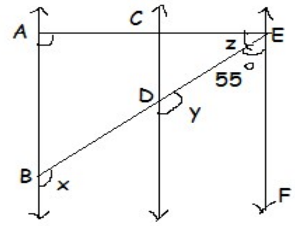
61. In the figure, if $PQ||ST$,∠PQR=110^0 and ∠ RST=130^0, then find the measure of ∠QRS. **(DIFFICULT)**



62. It is given that ∠ XYZ = 64^0 and XY is produced to a point P. Draw a figure from the given information. If ray YQ bisects ∠ZYP, then find measures of ∠XYQ and reflex ∠QYP. **(DIFFICULT)**

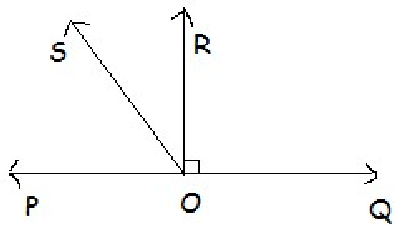
V. Answer the following questions (Four marks questions)

63. In fig, $AB||CD$ and $CD||EF$ also EA ⊥ AB, if ∠BEF = 55^0, then find the measures of x, y and z. **(DIFFICULT)**



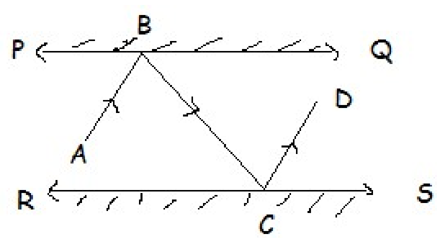
64. In the figure, POQ is a line. Ray OR is perpendicular to line PQ. OS is another ray lying between rays OP and OR. Prove that ∠ROS $=\frac{1}{2}$(∠QOS-∠POS)

(DIFFICULT)



65. In the figure PQ and RS are two mirrors placed parallel to each other and incident ray AB strikes the mirror PQ at B, the reflected ray moves along the path AB and strikes the mirror RS at C and again reflects back along CD. Prove that $AB||CD$.

(DIFFICULT)



CHAPTER – 7 TRIANGLES

Learning Outcomes:

1. Understand and apply concepts of congruence.

2. Understand and apply the properties of different triangle types.

Teaching Points:

1. Congruence of triangle

2. Criteria of congruence of triangle

3. Some properties of isosceles triangle and equilateral triangle.

EASY	AVERAGE	DIFFICULT	TOTAL
18	21	5	44

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries one mark)

1. Congruent figures among these **(EASY)**

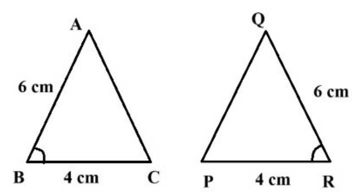
(A) Square and trapezium (B) Rectangle and circle

(C) Two circles of same radii (D) Scalene and Equilateral triangles

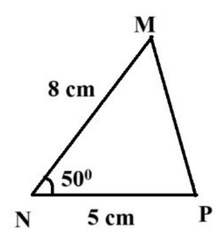
2. Observe the triangles, the correct statement among the following is **(EASY)**

(A) $\Delta ABC \cong \Delta QPR$ (B) $\Delta ABC \cong \Delta PQR$

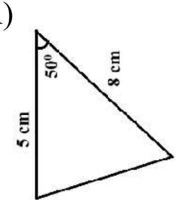
(C) $\Delta ACB \cong \Delta QRP$ (D) $\Delta ABC \cong \Delta QRP$



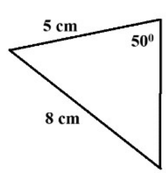
3. The triangle congruent to the given ΔMNP is **(EASY)**



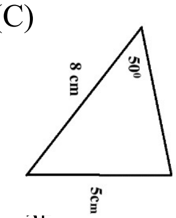
(A)



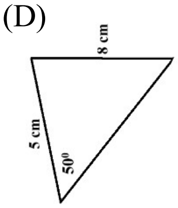
(B)



(C)



(D)

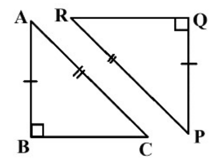


4. If $\Delta KLM \cong \Delta XYZ$ and $\angle L = 70^0$, $\angle M = 50^0$, then the measure of $\angle X$ is **(AVERAGE)**

(A) 50^0 (B) 60^0 (C) 70^0 (D) 120^0

5. The rule used to prove the congruency of ΔABC and ΔDEF given is **(EASY)**

(A) S.S.S (B) S.A.S (C)A.S.A (D) R.H.S



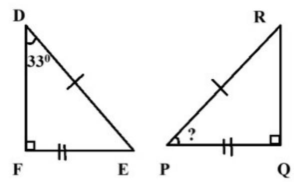
6. If $\Delta DEF \cong \Delta KLM$, then corresponding sides are **(AVERAGE)**

(A) $DE\ and\ LM$ (B) $EF\ and\ KL$ (C)EF and KM (D)$DF\ and\ MK$

7. In the given triangles the measure of $\angle P$ is **(AVERAGE)**

(A) 57^0 (B) 67^0

(C) 33^0 (D) 90^0



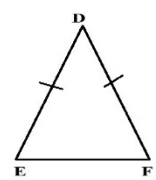
8. In an isosceles ΔBDE, $\angle B = \angle E$, then **(EASY)**

(A) BD = BE (B) DE = BE (C) BD = DE (D) DB = EB

9. In the given ΔDEF, $\angle D = 45^0$, the measure of $\angle E$ is **(AVEARGE)**

(A) 67.5^0 (B) 57.5^0

(C) 135^0 (D) 45^0



10. The measure of each angle in an equilateral triangle is **(EASY)**

(A) 180^0 (B) 90^0 (C) 60^0 (D) 30^0

11. In ΔDEF and ΔXYZ, $DE = XY, EF = YZ, DF = XZ$, $\angle Z = 35^0$ and $\angle X = 53^0$, the measure of $\angle E$ is **(AVERAGE)**

(A) 88^0 (B) 92^0 (C) 127^0 (D) 145^0

12. If equal angles of an isosceles triangle measure 50^0 each, then the measure of its third angle is **(AVERAGE)**

(A) 25^0 (B) 40^0 (C) 50^0 (D) 80^0

13. In two triangles OF = AE, OX = PE and XF = AP, then **(AVERAGE)**

(A) $\Delta FOX \cong \Delta APE$ (B) $\Delta XOF \cong APE$ (C) $\Delta FOX \cong \Delta AEP$ (D) $\Delta OXF \cong PEA$

14. It is given that $\Delta CAT \cong \Delta DOG$ and AT = 5 cm, $\angle A = 80^0$, $\angle T = 60^0$, then **(AVERAGE)**

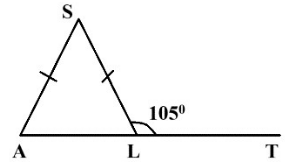
(A) $DO = 5cm, \angle D = 60^0$ (B) $OG = 5c\,m, \angle G = 80^0$

(C) $DG = 5c\,m, \angle G = 40^0$ (D) $GO = 5\,cm, \angle D = 40^0$

15. In the given figure SALT, $\angle SLT = 105^0$, then the measure of $\angle ASL$ is **(AVERAGE)**

(A) 30^0 (B) 75^0

(C) 85^0 (D) 105^0



16. In $\Delta ABC\ and\ \Delta QPR, \angle B = \angle P, and\ BC = PR$, the two triangles will be congruent by S.A.S congruence criteria if **(EASY)**

(A) AB = PR (B) BC = AB (C) AC = QR (D) AB = QP

II. Answer the following questions (One mark questions)

17. Define congruent triangles. **(EASY)**

18. Give an example of geometrical figures which are always congruent. **(EASY)**

19. Write the statement of A.S.A congruence rule. **(EASY)**

20. Write the statement of R.H.S congruence rule. **(EASY)**

21. Write the statement of S.S.S congruence rule. **(EASY)**

22.Write the statement of S.A.S congruence rule **(EASY)**

23. Write the corresponding vertices, if $\Delta PQR \cong \Delta XYZ$. **(EASY)**

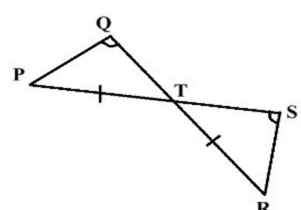
24. Write the corresponding sides, if $\Delta KLM \cong \Delta GHK$. **(EASY)**

25. In an isosceles ΔABC, $\angle A = \angle C$. Name the equal sides. **(EASY)**

III. Answer the following questions: (Two marks questions)

26. In the given figure PS and QR intersect at T, $\angle Q = \angle S$.

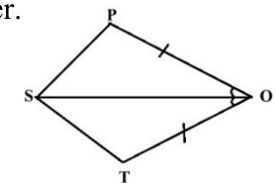
Prove that $\Delta PQT \cong \Delta RST$. **(AVERAGE)**



27. Prove that each angle of an equilateral triangle is 60^0. **(AVERAGE)**

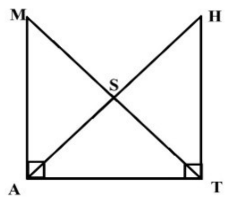
28. In the adjoining quadrilateral STOP, SO bisects $\angle O$, SP = 5cm, **(AVERAGE)**

Find the length of ST and give reason for your answer.

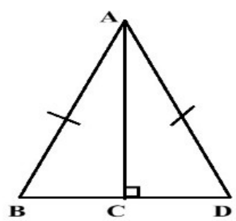


29. CAR is a right triangle, right angled at R. Acute angles are in the ratio $2:3$. Find the measure of acute angles. **(AVERAGE)**

30. In the given figure MATHS, $AH = MT$. Prove that AM=HT. **(AVERAGE)**

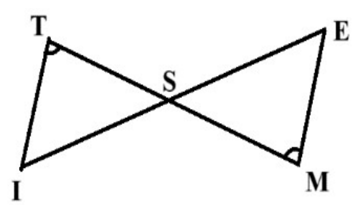


31.In the $\Delta ABD, AC \perp BD$, using RHS congruence rule prove that $\angle B = \angle D$. **(AVERAGE)**



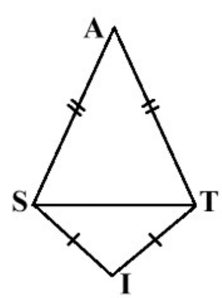
32. In an isosceles right triangle, find the measure of all the three angles. **(EASY)**

33. Observe the figure, Line segment TM and EI intersect at S, S is the midpoint of TM and $\angle T = \angle M$. Prove that $\Delta SIT \cong \Delta SEM$.



(AVERAGE)

34. ΔSAT and ΔSIT are isosceles triangles are on the same base ST. Prove that $\angle ASI = \angle ATI$. **(AVERAGE)**



IV. Answer the following questions: (Three marks questions)

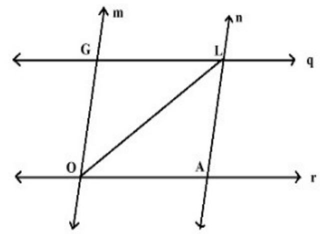
35. Prove that "each diagonal of a rectangle divides it into two congruent triangles".

(AVERAGE)

36. In the given figure, $m \parallel n$ and $q \parallel r$. Prove that **(AVERAGE)**

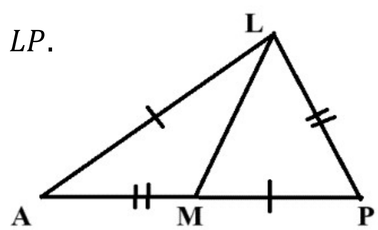
i) $\Delta OGL \cong \Delta OAL$ using S.S.S congruence rule.

ii) $\angle G = \angle A$



37. AB is a line segment and line l is its perpendicular bisector. If a point P lies on l, prove that P is equidistance from A and B. **(AVERAGE)**

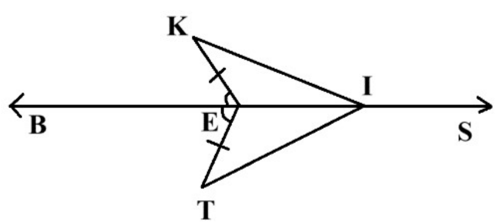
38. In the given figure LAMP, $AL = MP, AM = LP$. Prove that $\angle ALM = \angle LMP$. **(EASY)**



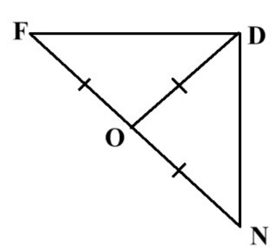
39. In the given quadrilateral KITE, BS bisects $\angle KET$ and KE = ET. **(DIFFICULT)**

Prove that i) $\Delta KEI \cong \Delta TEI$.

ii) KI = TI.



40. In the given ΔFND. FO = ON = OD. Prove that $\angle FDN = 90^0$. **(DIFFICULT)**

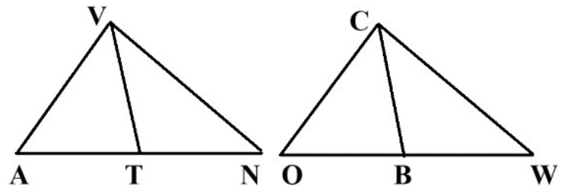


V. Answer the following questions: (Four marks questions)

41. In the given figure, $\Delta VAN \cong \Delta COW$, VT and CB are their medians.

Prove that: i) $\Delta VAT \cong \Delta COB$

ii) VT = CB

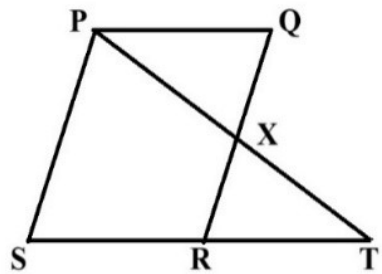


(DIFFICULT)

42. PQRS is a parallelogram in which X is the mid-point of QR. **(DIFFICULT)**

Prove that: i) $\Delta PXQ \cong \Delta TXR$

ii) ST = 2PQ



VI. Answer the following questions: (Five marks questions)

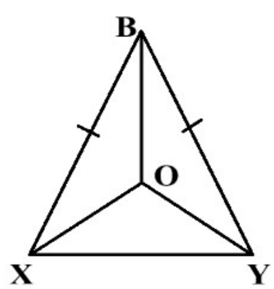
43. In the given figure, ΔBXY is an isosceles triangle, bisector of $\angle X$ *and* $\angle Y$ intersect at O.

Prove that

i) OX = OY

ii) $\Delta BOX \cong \Delta BOY$

iii) OB bisects $\angle XBY$



(AVERAGE)

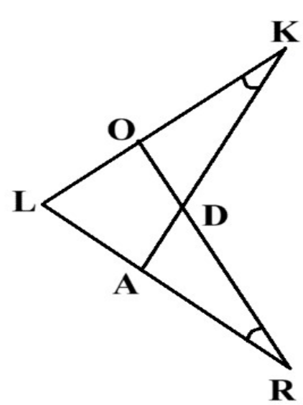
44. In the figure KOLARD, $\angle AKL = \angle ORL$ and KL=RL. **(AVERAGE)**

Prove that

i) $\Delta KAL \cong \Delta ROL$

ii) AK = OR

iii) AR = OK



CHAPTER 8 – QUADRILATERALS

Learning outcome: Derives proofs of mathematical statements related to quadrilateral and solves problems using them.

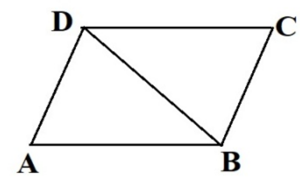
Teaching Points:

* **Properties of a parallelogram.**
* **Mid-point theorem.**

EASY	AVERAGE	DIFFICULT	TOTAL
16	44	6	64

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet.

1. In the figure, the diagonal of the parallelogram ABCD is



(A) AB (B) DC
(C) DB (D) AD

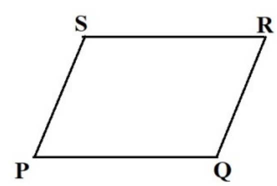
[EASY]

2. The sum of all the angles of a parallelogram is

(A) 90^0 (B) 180^0 (C) 270^0 (D) 360^0

[EASY]

3. In the figure, If PQRS is a parallelogram then, $\angle P$ =



(A) $\angle R$ (B) $\frac{1}{2}\angle R$
(C) $2\angle R$ (D) $3\angle R$

[EASY]

4. If the diagonals of a parallelogram are equal then it is a

(A) Kite (B) Rectangle (C) Rhombus (D) Trapezium

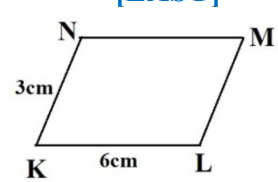
[EASY]

5. In a parallelogram, the sum of any two consecutive angles measure

(A) 90º (B) 100º (C) 150º (D) 180º

[EASY]

6. In the figure, KLMN is a parallelogram. If KL = 6cm and NK = 3cm, then the perimeter of the parallelogram is



(A) 9cm (B) 18cm
(C) 24cm (D) 30cm

[AVERAGE]

7. In a parallelogram, if all the four sides are equal in length then it is a

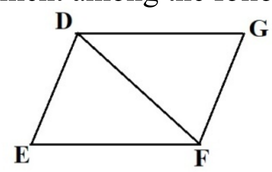
(A) Trapezium (B) Kite (C) Rectangle (D) Rhombus

[EASY]

8. In the figure, DEFG is a parallelogram. The correct statement among the following is

(A) $\angle E + \angle D = 90^0$ (B) $\angle D \neq \angle F$

(C) $\angle EDF = \angle DFG$ (D) $\angle E = 2\,\angle G$



[EASY]

9. In a parallelogram, if one of the angle measures 90^0, then it becomes a

(A) Rectangle (B) Trapezium (C) Rhombus (D) Kite

[EASY]

10. With respect to a parallelogram, the correct statement among the following is

(A) Opposite sides are equal but not parallel.

(B) Opposite angles are always supplementary.

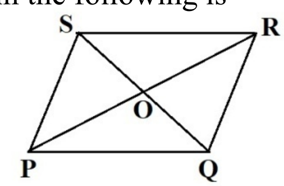
(C) Diagonals bisect each other.

(D) Diagonals are unequal and do not bisect each other. **[AVERAGE]**

11. In the figure PQRS is a parallelogram. The correct statement in the following is

(A) PO = 2OR (B) OQ = OS

(C) PR = QS (D) PQ = 2 SR



[EASY]

12. If one of the angle of a parallelogram is 70^0, then the measure of its adjacent angle is

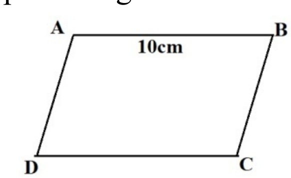
(A) 20^0 (B) 70^0 (C) 90^0 (D) 110^0

[AVERAGE]

13. In the figure, ABCD is a parallelogram. If the perimeter of the parallelogram is 36cm and one of its side is 10cm, then the length of BC is

(A) 5cm (B) 8cm

(C) 10cm (D) 26cm



[AVERAGE]

14. If an angle of a parallelogram is two third of its adjacent angle, then its smallest angle is

(A) 54^0 (B) 72^0 (C) 81^0 (D) 108^0 **[AVERAGE]**

15. In a parallelogram, if the sum of the opposite angles is 80^0, then each of those opposite angle measures **[AVERAGE]**

(A) 20^0 (B) 40^0 (C) 80^0 (D) 100^0

16. If one angle of a parallelogram is 24^0 less than twice its smallest angle, then the largest angle is

(A) 68^0 (B) 102^0 (C) 112^0 (D) 136^0

[AVERAGE]

17. The bisectors of any two adjacent angles of a parallelogram intersect at an angle

(A) 30^0 (B) 45^0 (C) 60^0 (D) 90^0

[AVERAGE]

18. In a parallelogram ABCD, if $\angle A = 75^0$ then $\angle D - \angle C$ measures

(A) 5^0 (B) 20^0 (C) 30^0 (D) 60^0

[DIFFICULT]

19. The bisectors of the angles of a parallelogram enclose a

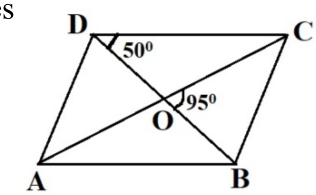
(A) Parallelogram (B) Rhombus (C) Rectangle (D) Square

[AVERAGE]

20. In the figure, ABCD is a parallelogram. Diagonals AC and BD intersect at 'O'. If $\angle CDO = 50^0$ and $\angle COB = 95^0$, then $\angle OAB$ measures

(A) 30^0 (B) 45^0

(C) 50^0 (D) 60^0



[DIFFICULT]

21. In a parallelogram, if the adjacent angles are in the ratio 2 : 3, then the measure of these adjacent angles are

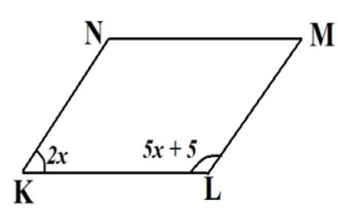
(A) 20^0 and 30^0 (B) 36^0 and 54^0 (C) 60^0 and 120^0 (D) 72^0 and 108^0

[AVERAGE]

22. In the figure, KLMN is a parallelogram. If $\angle K$ and $\angle L$ are $(2x)$ and $(5x + 5)$ respectively, then the value of 'x' is

(A) 25^0 (B) 30^0

(C) 50^0 (D) 130^0



[AVERAGE]

23. ABCD is a rhombus such that ∠ACB = 40^0, then ∠ADB =

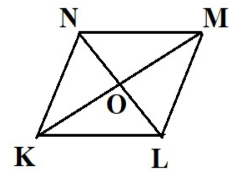
(A) 40^0 (B) 45^0 (C) 50^0 (D) 60^0

[AVERAGE]

24. In the figure, if KLMN is a rhombus, then ∠MOL measures

(A) 45^0 (B) 60^0

(C) 80^0 (D) 90^0



[AVERAGE]

25. The perimeter of a rhombus of side of length 10cm is

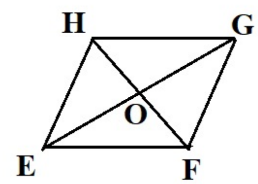
(A) 10cm (B) 14cm (C) 20cm (D) 40cm

[AVERAGE]

26. In the figure, EFGH is a rhombus. The correct statement among the following is

(A) ∠E = ∠F = ∠G = ∠H = 90^0 (B) EG = HF

(C) EF = 2FG (D) ∠HOG =90^0 and OE = OG



[AVERAGE]

27. The sum of any two consecutive angles of a rhombus measures

(A) 60^0 (B) 90^0 (C) 180^0 (D) 360^0

[EASY]

28. If the diagonals of a rhombus measure 18cm and 24cm, then the length of each side of the rhombus is

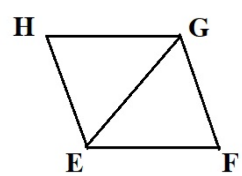
(A) 15cm (B) 16cm (C) 17cm (D) 20cm

[AVERAGE]

29. In the figure, EFGH is a rhombus. If EF = EG, then ∠EGF measures

(A) 45^0 (B) 50^0

(C) 60^0 (D) 70^0

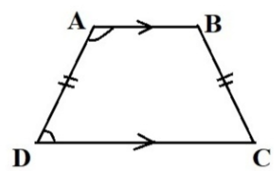


[AVERAGE]

30. In the figure, the sum of the measures of ∠A and ∠D is

(A) 90^0 (B) 180^0

(C) 270^0 (D) 360^0

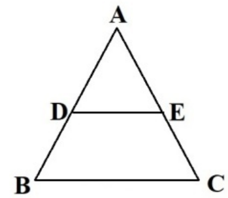


[AVERAGE]

31. In ΔABC, D and E are the midpoints of AB and AC respectively. The relation between DE and BC is

(A) DE = BC (B) DE ⊥ BC

(C) DE = 2BC (D) DE = $\frac{1}{2}$BC

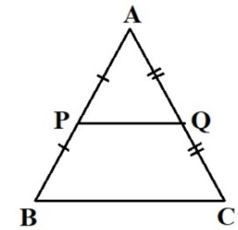


[EASY]

32. In ΔABC, the correct relation is

(A) PQ = 2BC (B) BC = 2PQ

(C) BC = $\frac{1}{2}$ PQ (D) BC = 3PQ

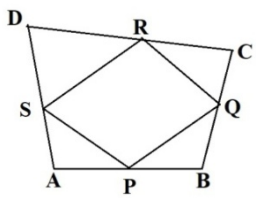


[EASY]

33. In a quadrilateral ABCD, If P, Q, R and S are the midpoints of AB, BC, CD and AD respectively then the quadrilateral formed by joining these midpoints is

(A) Rhombus (B) Square

(C) Rectangle (D) Parallelogram

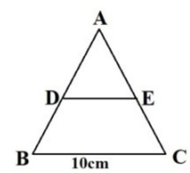


[EASY]

34. In ΔABC, D and E are the midpoints of AB and AC respectively. If BC = 10cm, then the length of DE is

(A) 2.5cm (B) 5cm

(C) 10cm (D) 20cm

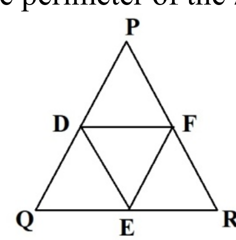


[AVERAGE]

35. In ΔPQR, D, E and F are the midpoint of the sides PQ, QR and RP respectively. If the perimeter of the ΔDEF is 24cm, then the perimeter of the ΔPQR is

(A) 12cm (B) 24cm

(C) 48cm (D) 72cm



[AVERAGE]

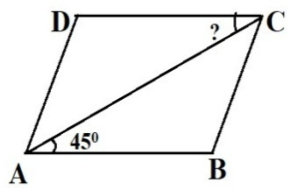
II. Answer the following questions:(One mark questions)

36. Write any two properties of parallelogram. **[EASY]**

37. Write any two properties of rhombus. **[EASY]**

38. Write the statement of mid-point theorem. **[EASY]**

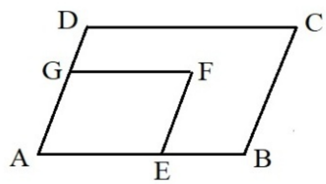
39. In the figure, ABCD is a parallelogram. If ∠BAC = 45^0, then write the measure of ∠DCA.



[AVERAGE]

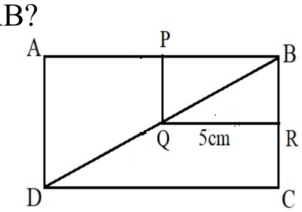
40. In a parallelogram, if one of the angle is twice the adjacent angle, then write the measures of adjacent angles. **[AVERAGE]**

41. In the figure ABCD and AEFG are two parallelograms. If ∠C = 55º, then find ∠AEF.



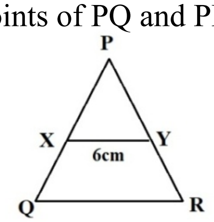
[AVERAGE]

42. In the figure ABCD and PQRB are rectangles. Q is the mid-point of BD. If QR = 5cm, then what is the measure of AB?



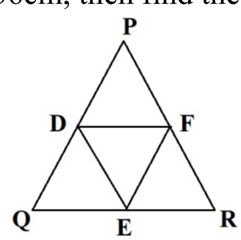
[AVERAGE]

43. In ΔPQR, X and Y are the midpoints of PQ and PR. If XY = 6cm, then find the length of QR.



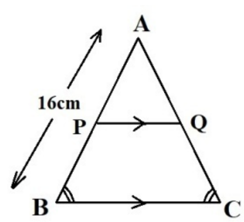
[EASY]

44. In ΔPQR, D, E and F are the midpoint of the sides PQ, QR and RP respectively. If the perimeter of the ΔPQR is 36cm, then find the perimeter of the ΔDEF.



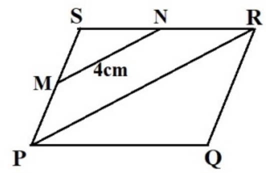
[AVERAGE]

45. In ΔABC, P is the midpoint of AB and AB = 16cm. If PQ ∥ BC, then write the length of AQ.



[DIFFICULT]

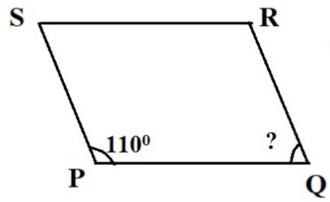
46. PQRS is a parallelogram. M and N are the midpoints of PS and SR. If MN = 4cm then find the length of the diagonal PR.



[AVERAGE]

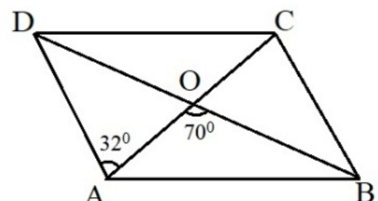
III. Answer the following questions:(Two marks questions)

47. In the figure, PQRS is a parallelogram. If $\angle P = 110^0$, then find the measure of $\angle Q$.



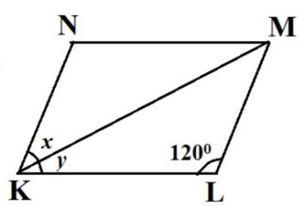
[EASY]

48. In the figure ABCD is a parallelogram. If $\angle DAC = 32^o$ and $\angle AOB = 70^o$, then find the measure of $\angle DBC$.



[AVERAGE]

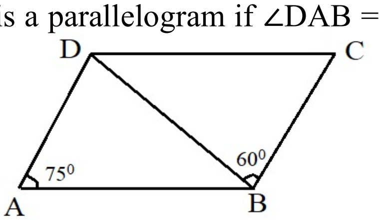
49. In the figure KLMN is a parallelogram. Find the values of 'x' and 'y'.



[AVERAGE]

50. If one angle of a parallelogram is two - third of its adjacent angle, then find the angles of the parallelogram. **[AVERAGE]**

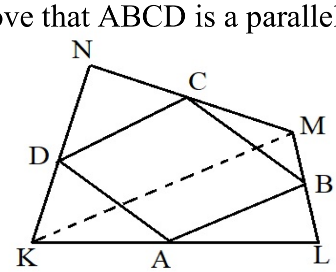
51. In the figure ABCD is a parallelogram if $\angle DAB = 75^o$ and $\angle DBC = 60^o$, find $\angle CDB$ and $\angle ADB$



[DIFFICULT]

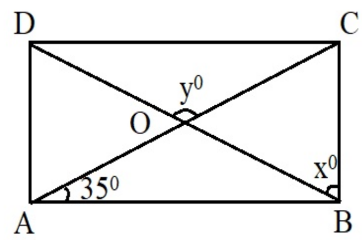
IV. Answer the following questions: (3 Mark questions)

52. In the figure KLMN is a quadrilateral A, B, C and D are the midpoints of sides KL, LM, MN and NK respectively. Prove that ABCD is a parallelogram.



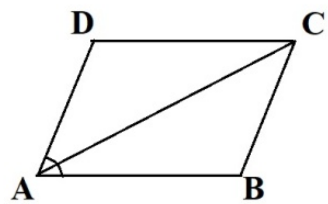
[AVERAGE]

53. In the figure ABCD is a rectangle. Find the values of x and y.



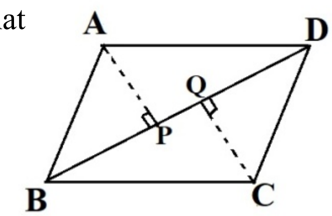
[DIFFICULT]

54. Diagonal AC of a parallelogram ABCD bisects ∠A as shown in the figure.
Show that
(i) It bisects ∠C also,
(ii) ABCD is a rhombus.



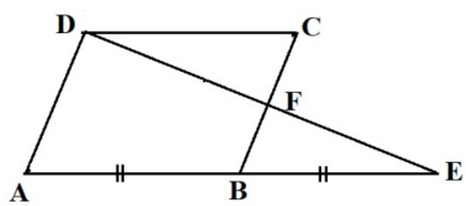
[AVERAGE]

55. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD, as shown in the figure. Show that
(i) ΔAPB ≅ ΔCQD
(ii) AP = CQ



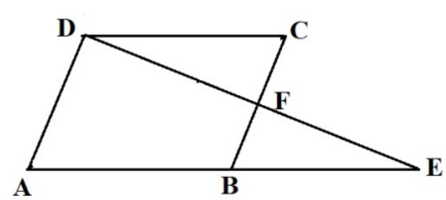
[AVERAGE]

56. In the figure, ABCD is a parallelogram. If AB is produced to E such that AB = BE, then show that ED bisects BC.



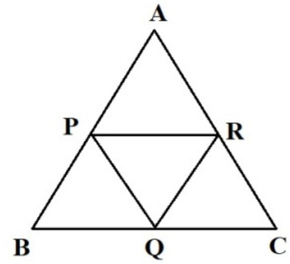
[AVERAGE]

57. In the figure, ABCD is a parallelogram. ‘F’ is the midpoint of side BC. If AB and DF are produced to meet at ‘E’, then show that AE = 2AB



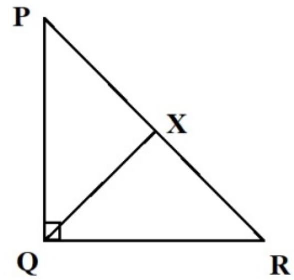
[AVERAGE]

58. If P, Q and R are the midpoints of the sides AB, BC and CA of an equilateral triangle ΔABC, then prove that ΔPQR is also an equilateral triangle.



[AVERAGE]

59. In the figure, ΔPQR is a right angled at ‘Q’. If ‘X’ is the midpoint of PR, then show that XP = XQ = XR.



[AVERAGE]

V. Answer the following questions: (Four marks questions)

60. Prove that “The diagonals of a parallelogram bisect each other.” **[AVERAGE]**

61. Prove that, “In a parallelogram, the bisectors of any two consecutive angles intersects at right angles.” **[DIFFICULT]**

VI. Answer the following questions: (Five marks questions)

62. Prove that “The line segment joining the midpoints of two sides of a triangle is parallel to the third side” **[AVERAGE]**

63. Prove that, “the bisectors of the angles of a parallelogram form a rectangle” **[AVERAGE]**

64. Prove that, “the line joining the midpoints of consecutive sides of a quadrilateral form a parallelogram” **[AVERAGE]**

CHAPTER – 9 CIRCLES

Learning Outcomes:

- Apply theorems regarding angle subtended by a chord in a circle in order to find the measure of an angle in the given figure.
- Apply the property of perpendicular from the centre to the chord in order to solve for the missing values (lengths and angles) in a given figure.
- Use the value of radius and perpendicular to the chord in order to compute the length of a chord.
- Interpret and apply theorems on the angles subtended by arcs of a circle in order to solve for unknown values in given examples.
- Apply the relation between angles of a cyclic quadrilateral in order to solve for the value of a given angle.

TEACHING POINTS

- **Understanding basic concepts related to circles, Cyclic quadrilateral.**
- **Proving theorems logically and applying them to solve problems**

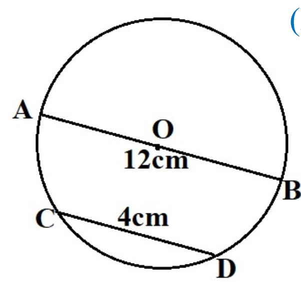
EASY	AVERAGE	DIFFICULT	TOTAL
12	29	09	50

I. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. (Each question carries 1 mark)

1. Given a circle with centre 'O' and smaller chord CD of length 4cm, longest chord AB is 12cm, then the radius of the circle is (EASY)

   (A) 2cm (B) 4cm

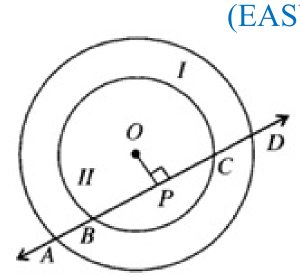
   (C) 6cm (D) 12cm



2. Given two concentric circles with centre O, A line cuts the circles at A, B, C, D respectively. If AB =3cm, then the length of CD is (EASY)

   (A) 1.5cm (B) 3cm

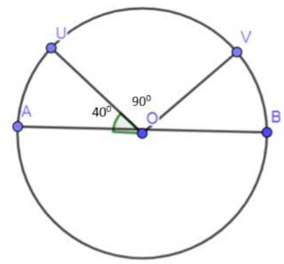
   (C) 6cm (D) 12cm



3. In the given circle with centre O. If $\angle AOU = 40^0$, then the measure of $\angle BOV$ is (EASY)

(A) 50^0 (B) 80^0

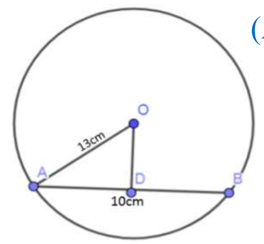
(C) 90^0 (D) 180^0



4. In the given circle with centre O, chord AB=10cm and AO =13 cm. The distance of the chord from the centre is (AVERAGE)

(A) 5cm (B) 10cm

(C) 12cm (D) 13cm



5. AD is a diameter of a circle and AB is a chord. If AD = 34cm, AB = 30cm, the distance of AB from the centre of the circle is (DIFFICULT)

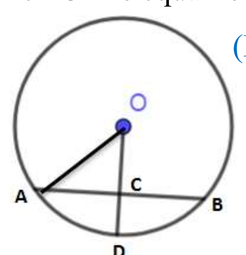
A) 17cm B) 15cm

C) 4cm D) 8cm

6. In the given figure, if OA=5cm, AB= 8cm and OD⊥AB then CD is equal to (DIFFICULT)

A) 2cm B) 3cm

C) 4cm D) 5cm



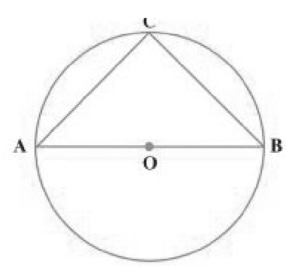
7. If AB=12cm, BC=16cm and AB ⊥BC, then the radius of the circle passing through the points A, B and C is (DIFFICULT)

A) 6cm B) 8cm C) 10cm D) 12cm

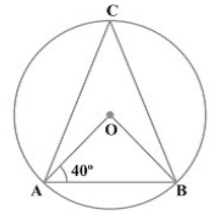
8. In the figure if AOB is a diameter of the circle and AC=BC then ∠CAB is equal to (AVERAGE)

A) 30^0 B) 60^0

C) 90^0 D) 45^0



9. In the figure, if ∠OAB=40^0 then ∠ACB is equal to (AVERAGE)

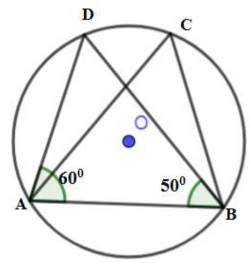


A) 50^0 B) 40^0

C) 60^0 D) 70^0

10. In the figure, if ∠DAB=60^0. ∠ABD=50^0 then ∠ACB is equal to

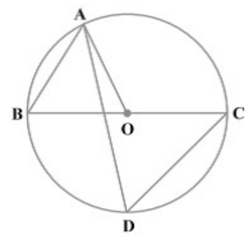
(AVERAGE)



A) 60^0 B) 50^0

C) 70^0 D) 80^0

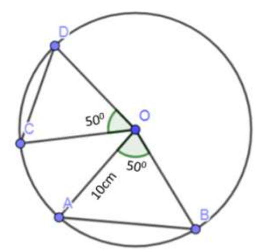
11. In the figure BC is a diameter of the circle and ∠BAO=60^0. Then the measure of ∠ADC is (AVERAGE)



A) 30^0 B) 45^0

C) 60^0 D) 120^0

12. In the given circle with centre ‘O’, $\angle AOB = \angle COD = 50^0$, DC=10cm. Then the length of AB is (EASY)

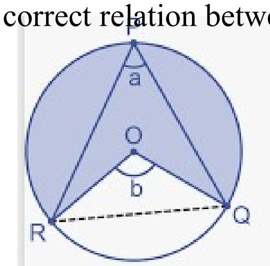


(A) 5cm (B) 10cm

(C) 15cm (D) 20cm

13. In the given figure O is the centre of the circle. The correct relation between ‘a’ and b’ is

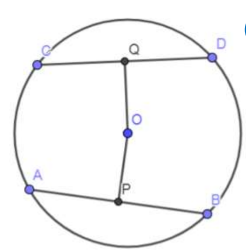
(EASY)



(A) $a = \frac{1}{2}b$ (B) $a = b$

(C) $a = 2b$ (D) $a = 3b$

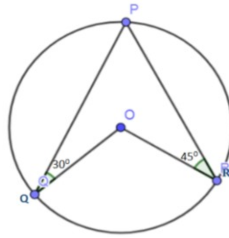
14. In the given figure O is the centre of the circle, $OP \perp AB$, $OQ \perp CD$ If OP = OQ and CD =8cm then AB = (EASY)



(A) 2cm (B) 4cm

(C) 5cm (D) 8cm

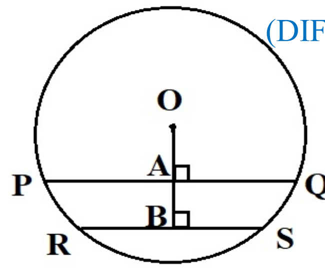
15. Observe the given figure, O is the centre of the circle. The measure of $\angle QOR$ is (AVERAGE)



(A) 30^0 (B) 50^0

(C) 65^0 (D) 130^0

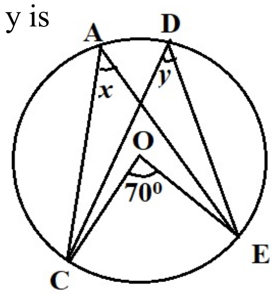
16. In the given circle O is the centre and its radius is 10cm, PQ=12cm and RS=16cm, then the measure of AB is (DIFFICULT)



(A) 2cm (B) 4cm

(C) 14cm (D) 16cm

17. In the given circle O is the centre, then the measure of y is (EASY)



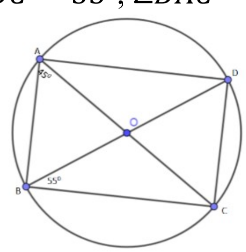
(A) 35^0 (B) 70^0

(C) $70 + x$ (D) 140^0

18. O is the centre of the circle, AB and CD are two chords of length 5cm and 6cm respectively and these chords subtend angles x^0 and y^0 at the centre of the circle respectively, then (AVERAGE)

(A) $x = y$ (B) $x < y$ (C) $x > y$ (D) $x \neq y$

19. In the given figure, O is the centre of the circle, $\angle DBC = 55^0$, $\angle BAC = 45^0$, then $\angle BCD$ is (AVERAGE)



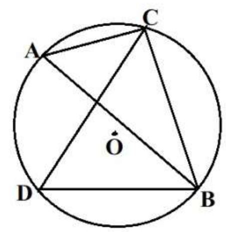
A) 50^0 (B) 55^0

(C) 100^0 (D) 80^0

20. ABCD is a cyclic quadrilateral such that AB is a diameter of the circle circumscribing it and $\angle ADC=140^0$,then the measure of $\angle BAC$ is (DIFFICULT)

A) 80^0 B) 40^0 C) 50^0 D) 120^0

21. In the given figure O is the centre of the circle. If $\angle BAC : \angle ABC = 4:5$, then the value of $\angle BDC$ is (AVERAGE)

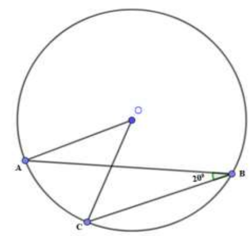


A) 10^0 (B) 40^0

(C) 55^0 (D) 90^0

II. Answer the following questions (One mark questions)

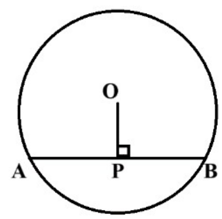
22. In the figure, if $\angle ABC = 20^0$. Find the measure of $\angle AOC$.



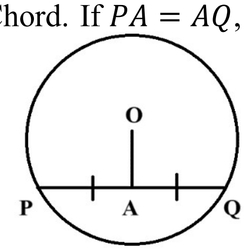
(AVERAGE)

23. Write the measure of sum of either pair of opposite angles of a cyclic quadrilateral. (AVERAGE)

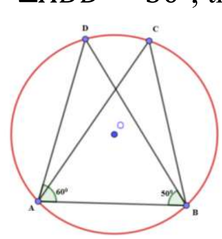
24. In the figure O is the centre of the circle, $PB = 4\ cm$. Find the length of the chord AB. (EASY)



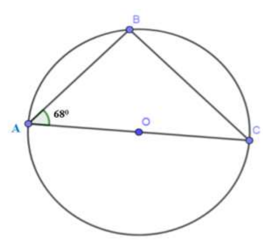
25. In the given circle with centre O and PQ is a Chord. If $PA = AQ$, then write the relation between PQ and OA. (EASY)



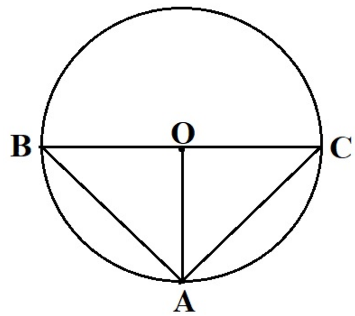
26. In the figure if $\angle BAC = 60^0$, $\angle ABD = 50^0$, then find the measure of $\angle ACB$ (AVERAGE)



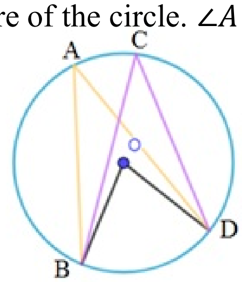
27. In the given circle with centre O, $\angle BAO = 68^0$, AC is the diameter. Find the measure of $\angle BCO$. (EASY)



28. In the given circle with centre O, AB=AC. If $\angle BOA = 90^0$. Determine the measure of $\angle AOC$. (AVERAGE)



29. In the given figure O is the centre of the circle. $\angle A = \angle C$, Give reason. (EASY)

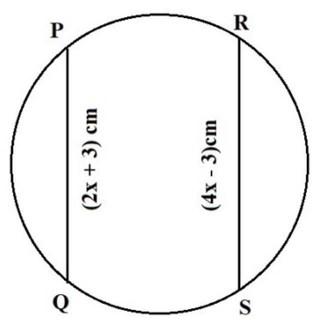


30. Define cyclic quadrilateral. (EASY)

III. Answer the following questions: (Two marks questions)

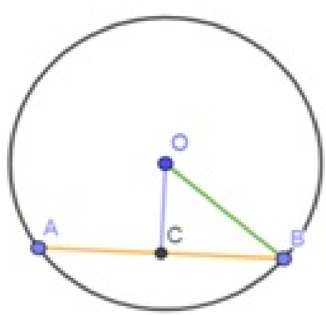
31. In the figure PQ and RS are equal chords of a circle. Find the value of x.

(AVERAGE)

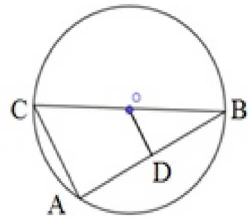


32. In the figure O is the centre of the circle, B is at a distance of 12 cm from its centre and length of the chord AB is 10cm. Find the distance of the chord from its centre.

(AVERAGE)

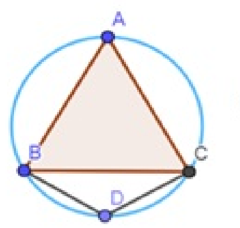


33. If BC is a diameter of a circle with centre O and OD is perpendicular to the chord AB of a circle. Show that AC=2(OD) (AVERAGE)

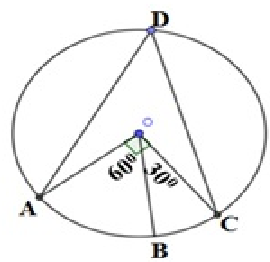


34. In the given figure ΔABC is an equilateral triangle and ABCD is a cyclic quadrilateral, then find the measure of $\angle BDC$.

(AVERAGE)



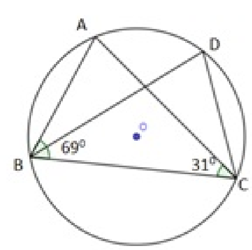
35. In the figure A, B and C are three points on the circle with centre O such that $\angle BOC = 30^0$ and $\angle AOB = 60^0$. If D is a point on the circle other than the arc ABC. Find the measure of $\angle ABC$.



(AVERAGE)

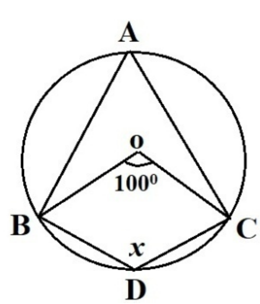
36. In the figure, $\angle ABC = 69^0$, $\angle ACB = 31^0$. Find the measure of $\angle BDC$.

(AVERAGE)



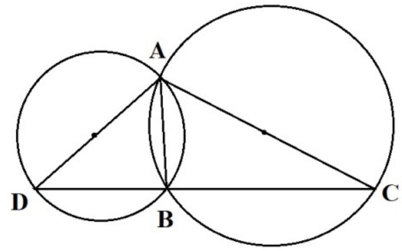
37. In the figure, O is the centre of the circle. If $\angle BOC = 100^0$, then find the value of x.

(AVERAGE)



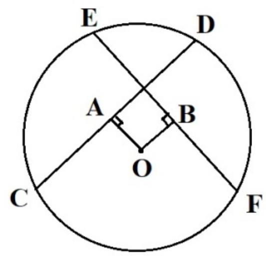
38. In the figure two circles intersect at two points A and B. AD and AC are diameters to the two circles. Prove that DBC is a line segment.

(AVERAGE)



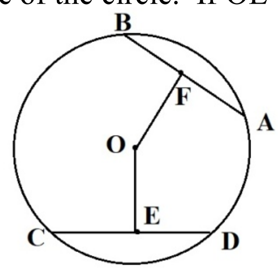
39. In the given figure, OA and OB are respectively perpendiculars to the chords CD and EF of a circle whose centre is O. If OA=OB, prove that arc EC = arc DF.

(DIFFICULT)

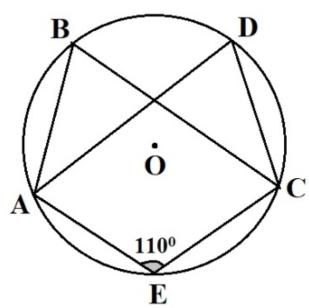


40. In the given figure O is the centre of the circle. If OE< OF, Show that CD>AB.

(AVERAGE)



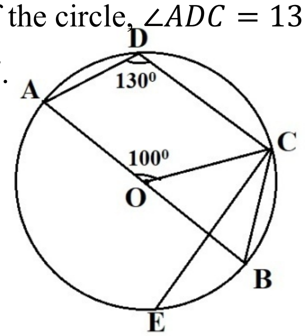
41. In the given figure, ABCE is a cyclic quadrilateral and O is the centre of the circle. If $\angle AEC = 110^0$, then find the measure $\angle ABC$ and $\angle ADC$. (AVERAGE)



IV. Answer the following questions: (Three marks questions)

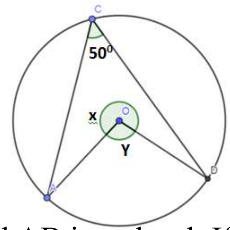
42. In the given figure, O is the centre of the circle, $\angle ADC = 130^0$ and the chord BC = chord BE. Find the measure of $\angle CBE$.

(DIFFICULT)

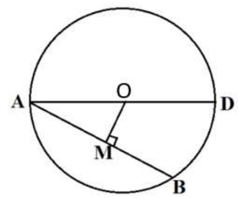


43. If circles are drawn taking two sides of a triangle as diameter. Prove that the point of intersection of these circles lie on the third side. (AVERAGE)

44. In the figure, O is the centre of the circle. Find the value of x (AVERAGE)



45. AD is a diameter of a circle with centre O and AB is a chord. If AD = 34cm, AB =30cm, then find the distance of AB from the centre of the circle. (AVERAGE)

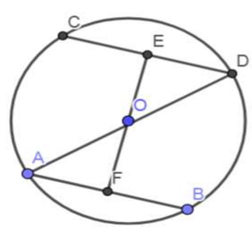


46. Prove that, "If the angles subtended by the chords of a circle at the centre are equal then chords are equal". (AVERAGE)

IV. Answer the following questions (Four marks questions)

47. If the diagonals of a cyclic quadrilateral are diameter of a circle through the opposite vertices of the quadrilateral. Prove that the quadrilateral is a rectangle. (AVERAGE)

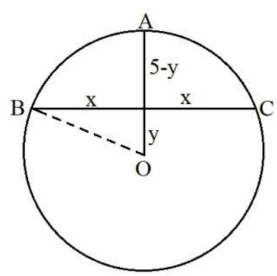
48. In the figure AB||CD. AD is a diameter of the circle whose centre is O. Prove that AB = CD. (DIFFICULT)



V. Answer the following questions: (Five marks questions)

49. Prove that, "The sum of either pair of opposite angles of a cyclic quadrilateral is supplementary". (AVERAGE)

50. In the circle of centre O, radius 5cm, AB and AC are the two chords of length 6cm each. Find the length of the chord BC. (DIFFICULT)



CHAPTER – 10 HERON'S FORMULA

LEARNING OUTCOMES:

- Applies appropriate formulae in order to find areas of all types of triangles
- Understands the concept of Heron's formula.
- Apply the formula to find area & solve real life problems.

Teaching points

- **Area of triangle – by Heron's formula.**
- **Problems solving using the formula.**
- **Problems related to area of equivalent triangle.**

LEVEL OF DIFFICULTY

EASY	AVERAGE	DIFFICULT	TOTAL
7	12	5	24

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet (Each question carries one marks)

1. In Heron's formula, $\sqrt{s(s-a)(s-b)(s-c}$) if a , b , c are the sides of a triangle then the value of ' s ' is (EASY)

   A) $a+b+c$ B) $\frac{a+b+c}{2}$ C) $\frac{a+b+c}{4}$ D) $2a+2b+2c$

2. If one side of an isosceles triangle is 5cm & its equal sides measures 3cm each, then half of its perimeter is (EASY)

   A) 11cm B) 5.5cm C) 10cm D) 22cm

3. The sides of a triangle are 8cm & 11cm. If the perimeter of triangle is 32cm, then the third side measures (AVERAGE)

   A) 8cm B) 11cm C) 13cm D) 32cm

4. If the semi perimeter of a triangle is 6cm & sides are 3cm, 4cm & 5cm then its area is (AVERAGE)

   A) 6 cm^2 B) 12cm^2 C) 18cm^2 D) 24cm^2

5. An isosceles right triangle has area 8cm^2. The length of its hypotenuse is (AVERAGE)

   A) $\sqrt{32}cm$ B) $\sqrt{16}cm$ C) $\sqrt{48}cm$ D) $\sqrt{24}cm$

6. A traffic signal board is an equilateral triangle with side 'a', then the area of the traffic signal board is (AVERAGE)

A) $\frac{\sqrt{3}}{2}a^2$ B) $\frac{\sqrt{3}}{4}a^2$ C) $\frac{\sqrt{3}}{2}a$ D) $\frac{\sqrt{3}}{4}a$

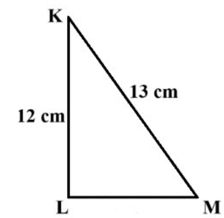
7. The sides of a parallelogram are 60m and 80 m & the length of the longest diagonal is 100m. The area of the parallelogram is (AVERAGE)

A) 2400 cm^2 B) 4800 cm^2 C) 9600 cm^2 D) 1200 cm^2

8. How much area is enclosed by the given triangle (EASY)

A) 156 cm^2 B) 78cm^2

C) 30 cm^2 D) 25 cm^2



II. Answer the following questions: (One mark questions)

9. If a, b, c are the sides of a triangle, 's' is the semi perimeter then write the formula to find the area of this triangle. (EASY)

10. The three sides of a triangle are 18cm, 10cm, & 14cm. Find its semi perimeter. (EASY)

11. If the perimeter of an equilateral triangle is 180cm, then find the measure of its side. (EASY)

12. The perimeter of a given triangle is 30cm. The sides are in the ratio 1 : 3 : 2 then, find its smallest side. (AVERAGE)

13. If the semi perimeter is 235cm, a = 150cm, b = 120cm, c = 200cm, then find the value of $(s-a)(s-b)(s-c)$ (AVERAGE)

14. "Heron's formula is applicable to all the types of triangles when their sides are given", Justify the statement. (EASY)

III. Answer the following questions: (Two marks questions)

15. The sides of a triangle are 122m, 22m, & 120m, its semi perimeter is 132m. Find its area. (AVERAGE)

16. The sides of a triangle are in the ratio 12 ∶ 17 ∶ 25& perimeter is 540cm, then find the measure of each side. (AVERAGE)

17. The perimeter of an isosceles triangle is 32cm. The ratio of the one of the equal side to its base is 3 : 2, then find the area of the triangle. (AVERAGE)

18. Using Heron's formula, find the area of an equilateral triangle of side "x" cm. (AVERAGE)

IV. Answer the following questions: (Three marks questions)

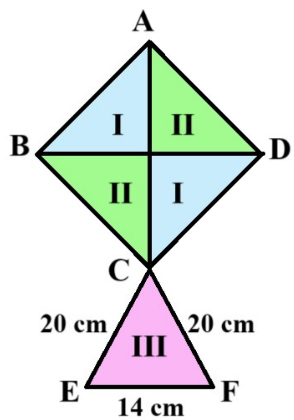
19. The ground is in the form of a triangle having the sides 26m, 28m and 30m.Find the cost of levelling the ground at the rate of ₹ 3 per square meter. (DIFFICULT)
20. A triangular park has sides 120m, 80m and 50m. A gardener has to put a fence all around it & also plant grass inside. How much area does he need to plant? (DIFFICULT)
21. The sides of a given triangle are 35cm, 54cm, and 61cm. Find the length of the longest altitude. (DIFFICULT)

V. Answer the following questions: (Four marks questions)

22. The side of a triangle is doubled. Find the percentage of area increased. (DIFFICULT)
23. A rhombus shaped sheet with perimeter 40cm with one of its diagonals 12cm, is painted on both sides at the rate of 5 per m^2. Find the cost of painting. (DIFFICULT)

VI. Answer the following questions: (Five marks questions)

24. In the given figure, ABCD is a square with diagonal 44cm and ΔCEF is an isosceles triangle. Find the area of region I (Light blue), region II (Green) and region III (Pink). (DIFFICULT)



CHAPTER – 11 SURFACE AREA AND VOLUMES

Learning Outcomes:

Derives formula for surface area and volume of cone and applies them to objects found in the surroundings.

Derives formula for surface area and volume of a sphere, hemisphere and applies them to objects found in the surroundings.

Teaching Points:

*** Lateral surface area and total surface area of a Right Circular Cone**
*** Surface area of a Sphere**
*** Lateral Surface and total surface area of a hemisphere**
***Volume of a Right Circular Cone**
***Volume of a Sphere**
*** Volume of hemisphere**

LEVEL OF DIFFICULTY

EASY	AVERAGE	DIFFICULT	TOTAL
23	30	21	74

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet (Each question carries one marks)

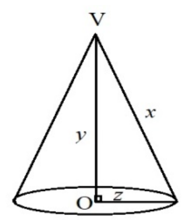
1. The formula used to find the curved surface area of a cone of radius 'r', and slant height 'l' in square units is (EASY)

   (A) πrl (B) $2\pi r(r+l)$ (C) $2\pi(r+l)$ (D) $2\pi rl$

2. In the given figure, a right circular cone is given with vertex 'v' and centre of circular base 'O'. The correct relationship between x^2, y^2 and z^2 is (EASY)

   (A) $y^2 = z^2 - x^2$ (B) $y^2 = x^2 - z^2$

   (C) $y^2 = x^2 + z^2$ (D) $y^2 = 2x^2 + z^2$



3. The radius of the base of a right circular cone is 7cm. If its slant height is 14cm, then its curved surface area is (EASY)

   (A) $108cm^2$ (B) $308cm^2$ (C) $402cm^2$ (D) $462\ cm^2$

4. . The height of a cone is 16cm and base radius is 12cm. Its slant height is (EASY)

(A) 8cm (B) 10cm (C) 15cm (D) 20cm

5. The surface area of a metallic sphere of radius 7cm is (EASY)

(A) 308 cm^2 (B) 462 cm^2 (C) 512 cm^2 (D) 616 cm^2

6. The curved surface of a cone is 308cm^2 and its slant height is 14cm. The radius of its base is (AVERAGE)

(A) 7cm (B) 8cm (C) 9cm (D) 12cm

7. A conical tent is 10m high and the radius of its base is 24m. The slant height of tent is (EASY)

(A) 25m (B) 26m (C) 27m (D) 28m

8. A Joker's cap is in the form of cone of base radius 7cm and height 24cm. The area of sheet to make 10 such caps is (AVERAGE)

(A) 3500 cm^2 (B) 5500 cm^2 (C) 6500 cm^2 (D) 8500 cm^2

9. The diameter of two cones are equal. If their slant heights are in the ratio 5 : 4, then the ratio of their curved surface areas is (AVERAGE)

(A) 4 : 5 (B) 5 : 4 (C) 16 : 25 (D) 25: 16

10. The Total surface area of a solid cone of radius 'r', height 'h' and slant height 'l' is (EASY)

(A) π rl (B) πr(r+l) (C) 2π(r+l) (D) 2πrl

11. The formula used to find the surface area of a sphere with radius 'r' (EASY)

(A) $2\pi r^2$ (B) πr^2 (C) $3\pi r^2$ (D) $4\pi r^2$

12. If the radius of sphere is 7cm, then its surface area is (EASY)

(A) 154cm^2 (B) 308 cm^2 (C) 616 cm^2 (D) 1232 cm^2

13. If the surface area of sphere is 1386 cm^2, then its radius is(use$\pi = \frac{22}{7}$) (AVERAGE)

(A) 7cm (B) 10.5 cm (C) 14cm (D) 21cm

14. If the radius of a sphere is doubled, then how many times does its surface area increases?

(A) 2 times (B) 3 times (C) 4 times (D) 8 times

(AVERAGE)

15. The ratio of the surface area of a sphere of radius 'r' to the surface area of a hemisphere of radius 'r' is (AVERAGE)

(A) 1 : 1 (B) 2 : 1 (C) 2 : 3 (D) 3 : 2

16. A solid sphere is cut into two hemispheres. The total surface area of one of the hemisphere is (EASY)

(A) $2\pi r^2$ (B) πr^2 (C) $3\pi r^2$ (D) $4\pi r^2$

17. If two solid hemispheres of same radius are joined together along their bases. Then surface area of this new solid is (EASY)

(A) $3\pi r^2$ (B) $4\pi r^2$ (C) $5\pi r^2$ (D) $6\pi r^2$

18. The surface area of a sphere is 'S'. If its radius is doubled, then its new surface area will be (EASY)

(A) 2S (B) 4S (C) 8S (D) S^2

19. The ratio of the radii two Spheres is 2:3.The ratio of their surface areas is (AVERAGE)

(A) 2 : 3 (B) 4 : 9 (C) 8 : 27 (D) $\sqrt{2}:\sqrt{3}$

20. The diameter of a sphere with surface area $346.5cm^2$ is (AVERAGE)

(A) 5.25cm (B) 5.75cm (C) 10.5cm (D) 11.5cm

21. The radius of a spherical balloon increases from 7cm to 14cm when air is pumped into it. The ratio of the surface area of original balloon to inflated one is (AVERAGE)

(A) 1 : 2 (B) 1 : 3 (C) 1 : 4 (D) 4 : 3

22. A hemispherical bowl has radius 10.5 cm. The number of litres of milk it can hold is (AVERAGE)

(A) 2.47 (B) 2.476 (C) 2.376 (D) 3.476

23. If the surface area of a sphere is $676\pi\ cm^2$, then it's radius is (AVERAGE)

(A) 8cm (B) 9cm (C) 12cm (D) 13cm

24. The radius of a sphere is 10cm. If its radius is increased by 1 cm, the Volume of the sphere is increased by (AVERAGE)

(A) 13.3 % (B) 21.1 % (C) 30 % (D) 33.1 %

25. The volume of conical tent is 462 m^3 and the area of base is $154m^2$. The height of the conical tent is (AVERAGE)

(A) 9m (B)1 cm (C) 15m (D) 24m

26. If the radius of a sphere is 2r, then its volume will be (EASY)

(A)$\frac{4}{3}\pi r^3$ (B) $4\pi r^3$ (C) $\frac{8}{3}\pi r^3$ (D)$\frac{32}{3}\pi r^3$

27. If the radius of hemisphere is 5cm, then its volume in cm^3 is (AVERAGE)

(A)$\frac{250}{3}\pi$ (B) $\frac{500}{3}\pi$ (C) 75π (D)$\frac{125}{3}\pi$

28. A solid metal sphere of radius 7cm cut through the centre into two equal parts. The total surface area of each part is (AVERAGE)

(A) $231cm^2$ (B) $308cm^2$ (C) $462\ cm^2$ (D) $924cm^2$

29. The radius of a hemispherical balloon increases from 6cm to 12cm as air is pumped into it. The ratio of the surface areas of the balloon in the two cases is (AVERAGE)

(A) 1 : 4 (B) 1 : 3 (C) 2 : 3 (D) 2 : 1

30. If the volume and surface area of a sphere is numerically equal, then its radius is (AVERAGE)

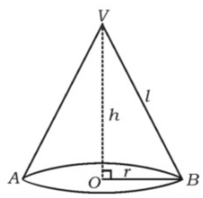
(A) 2 Units (B) 3 Units (C) 4 Units (D) 5 Units

31. The volume of a hemisphere is $18\pi cm^3$. Its radius is (AVERAGE)

(A). 2cm (B) 3cm (C) 2.6 cm (D) 4cm

II. Answer the following questions (One mark questions)

32. Write the formula to find the total surface area of the given solid figure. (EASY)



33. Find the lateral surface area of a right circular cone of height 28cm and base radius 21cm. (EASY)

34. Find the curved surface area of a right circular cone whose slant height is 10cm and base radius 21cm. (EASY)

35. Write the formula to find the curved surface area of hemisphere of radius r unit.(EASY)

36. Write the formula to find the total surface area of hemisphere with radius 'r' (EASY)

37. Find the curved surface area of a sphere of radius 21cm. (EASY)

38. Find the surface area of a sphere of radius 7cm. (EASY)

39. Find the total surface area of hemisphere of diameter 14 cm. (EASY)

40. The perimeter of circular base of a right circular cone is 22cm and its slant height is 10cm. Find the curved surface area of the cone. (EASY)

41. Write the formula to find the volume of a sphere of radius 'r' (EASY)

42. The volume and surface area of a sphere are numerically equal. Find its radius.(AVERAGE)

43. What is the ratio of total surface area of a sphere and a hemisphere of same radius? (AVERAGE)

44. The radius of the base and slant height of a cone are 4cm and 5cm respectively. Find the height of the cone. (AVERAGE)

45. The surface area of a sphere is 100π cm^2. Find its radius (AVERAGE)

III. Answer the following questions: (Two marks questions)

46. Find the lateral surface area of a right circular cone of height 28cm and base radius 21cm. (AVERAGE)

47. The circumference of the base of a 8m high conical tent is $\frac{44}{7}$ m^2. Find the area of canvas required to make the tent. (DIFFICULT)

48. Diameter of the base of a cone is 10.5 cm and its slant height is 10cm. Find its curved surface area. (AVERAGE)

49. Find the total surface area of a cone, if its slant height is 21m and diameter of its base is 24m. (AVERAGE)

50. Find the surface area of a sphere of diameter 14cm. (AVERAGE)

51. The curved surface area of a right circular cone is $550cm^2$. If its slant height is 25cm, then find the radius of the base of the cone. (AVERAGE)

52. The area of the base of a conical tent is 154 m^2. If its volume is 1232 m^3, then find the height of the conical tent. (DIFFICULT)

53. The radius of the base of a conical tent is 7m and its height is 24m. Find how many meters of cloth 5m wide is required to make the conical tent. (Take $\pi = \frac{22}{7}$) (DIFFICULT)

54. Find the volume of a right circular cone with radius 6cm and height 7cm. (AVERAGE)

55. The ratio of the volumes of two cones is 4: 5. If the ratio of the radii of their bases is 2 : 3, then find the ratio of their vertical heights. (DIFFICULT)

56. The circumference of the base of a hemispherical dome is 17.6m. Find its curved surface area. (AVERAGE)

57. The surface area of a metallic ball is 154 cm^2. Find its radius. (AVERAGE)

58. The surface area of a football is $100\pi cm^2$. Find the volume of air in it. (DIFFICULT)

59. A hemispherical tank has inner radius of 2.8m. Find its capacity in litres. (DIFFICULT)

60. The volumes of two spheres are in the ratio 64 : 27. Find the ratio of their surface areas. (DIFFICULT)

61. The surface area of a sphere is 144π m^2. Find its volume. (DIFFICULT)

62. The curved surface area of a solid hemispherical toy is 1232 cm^2. Find its radius. (DIFFICULT)

IV. Answer the following questions: (Three marks questions)

63. The height of cone is 16cm and its base radius is 12cm. Find the curved surface area and the total surface area of the cone (Use π =3.14) (DIFFICULT)

64. Find the volume of the largest right circular cone that can be cut out of a cube whose edge is 9cm. [neglect the wastage during the cutting process] (DIFFICULT)

65. The radius and height of a right circular cone are in the ratio 3 : 4. If the volume of the cone is $301.44 cm^3$, then find its slant height. (Take π = 3.14) (DIFFICULT)

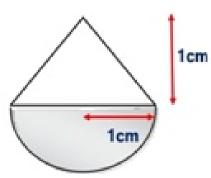
66. The height of a right circular cone is 16cm and its diameter is 24cm. Find the ratio of curved surface area to the total surface area. (DIFFICULT)

67. A hemispherical bowl made of brass has inner diameter 10.5cm. Find the cost of tin-plating it on the inside at the rate of Rs. 16 per $100 cm^2$. (DIFFICULT)

68. A shopkeeper has one spherical laddoo of radius 5cm. With the same amount of material find how many laddoos of radius 2.5cm can be made? (DIFFICULT)

69. A conical tent is to accommodate 11 persons. Each person must have 4 sq.m of the space on the ground and 20 cubic meters of air to breathe. Find the height of the conical tent. (DIFFICULT)

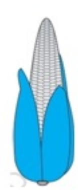
70. A solid is in the shape of a cone standing on a hemisphere with both their radii being equal to 1 cm and the height of the cone is equal to its radius. Find the volume of the solid in terms of π (DIFFICULT)



V. Answer the following questions: (Four marks questions)

71. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required. (DIFFICULT)

72. A corn cob (see fig) shaped somewhat like a cone, has the radius of its broadest end has 2.1cm and length (height) as 20cm.If each $1 cm^2$ of the surface of the cob carries an average of four grains, find how many grains you would find on the entire cob. (DIFFICULT)



73. The diameter of a sphere is decreased by 25%. Find by what percent its curved surface area will decrease? (DIFFICULT)

74. Twenty seven solid iron spheres, each of radius 'r' and surface area 'S' are melted to form a sphere with surface area S'. Find the (DIFFICULT)

(1) radius 'r' of the new sphere

(2) ratio of S and S'

CHAPTER – 12 STATISTICS

LEARNING OUTCOME:

Represents given data in different forms like, tabular form (grouped or ungrouped), bar graph, histogram (with equal and varying width and length), and frequency polygon in order to analyze given data.

Teaching Points

1. Bar graph
2. Histograph
3. Frequency polygon

EASY	AVERAGE	DIFFICULT	TOTAL
18	11	06	35

I. Four alternatives are given for each of the following questions/incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet (Each question carries one marks)

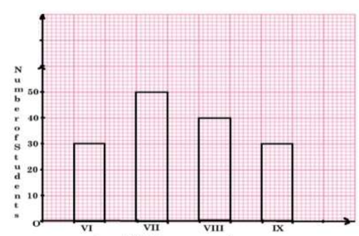
1. A visual representation of data using rectangular bars of different heights and equal spacing is (EASY)

A) Bar graph B) Sector graph C) Frequency polygon D) Histogram

2. In the given graph, the number of students in which two classes equal is (EASY)

A) VI and VIII B) VI and VII

C) VII and VIII D) VI and IX



3. In a bar graph, the length or height of a bar represents (EASY)

A) Class Interval B) Frequency C) Mid-point D) Data

4. In a histogram, the area of each bar is proportional to (EASY)

A) Class width B) Frequency C) Upper limit D) Mid-point

5. Histogram can be used directly for (EASY)

A) Primary data B) Continuous data C) Discrete data D) Secondary data

6. In a continuous class interval, the size of the class interval 20 – 30 is (EASY)

A) 10 B) 20 C) 25 D) 30

7. The class mark of the class interval 10 – 20is (EASY)

A) 10 B) 15 C) 20 D) 11

8. Given the class intervals 0 –10, 10 – 20, 20 – 30, --------- then 20 is considered in the class interval (EASY)

A) 10 – 20 B) 20 – 30 C) 10 – 30 D)15 – 25

9. If the size of the continuous class interval is 5, then the next Class Interval after 10 – 15 is

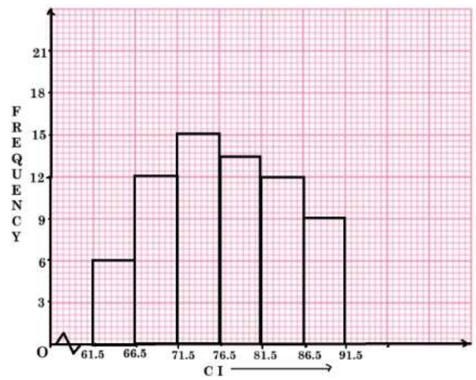
A) 15 – 20 B) 16 – 20 C) 15 – 19 D) 10 – 20

(EASY)

10. In the given graph frequency of class interval 71.5 – 76.5 is (EASY)

A) 9 B) 12

C) 15 D) 18



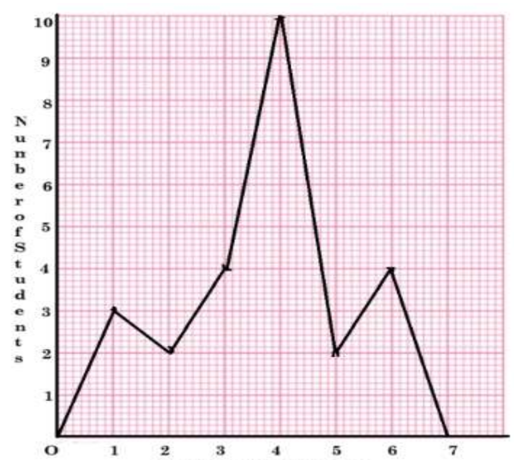
11. The graph suitable to compare the two different sets of data of same nature (EASY)

A) Histogram B) Pie chart C) Picture graph D) Frequency polygon

12. In the given graph, the number of students who read 6 books is (EASY)

A) 2 B) 3

C) 4 D) 5



13. Class mark can be calculated using formula as

A) $\frac{\text{Upper limit}}{2}$ B) $\frac{\text{Lower limit}}{2}$

C) $\frac{\text{Upper limit} - \text{lower limit}}{2}$ D) $\frac{\text{Upper limit} + \text{lower limit}}{2}$ (EASY)

II. Answer the following questions. (One mark questions)

14. Define Bar graph. (EASY)
15. Find the class-mark, if the class interval is 10 – 20. (EASY)
16. Data regarding number of boys born in particular month of year is recorded. Which graph is suitable to represent this data. (EASY)
17. Name the graph which is most suitable to compare the marks scored in FA-1& FA-2 of mathematics test marks. (EASY)

III. Answer the following questions. (Two marks questions)

18. The following table shows the daily production of toys in a factory (AVERAGE)

Number of toys	Number of days
0 - 50	5
50 - 100	8
100 - 150	12
150 - 200	5

Draw a histogram to represent this data.

19. Number of students in a class is 36. Students are divided into 5 groups as shown in the table below. Draw a bar graph for the following: (AVERAGE)

Group	A	B	C	D	E
Number of Students	5	8	6	10	7

20. The following table gives the marks obtained by students, construct a histogram.

Marks	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Students	2	5	7	10	6

(AVERAGE)

21. The marks obtained by 30 students in a test are given below. (AVERAGE)

Marks interval	No. of students
0 – 10	4
10 – 20	8
20 – 30	10
30 – 40	6
40 – 50	2

Draw a histogram for this data.

22. A family with monthly income of ₹22,000 has planned the following expenditure per month under various heads. (AVERAGE)

Heads	Expenditure in thousand rupees
Grocery	4
Education of children	5
Medicine	3
Rent	5
Fuel	2
Entertainment	1
Miscellaneous	1

Draw a bar graph for the data.

23. Given below are the seats won by the different political parties in the polling outcome of a state assembly election. (AVERAGE)

Political party	A	B	C	D	E	F
Seats won	75	55	37	29	10	37

Draw a bar graph to represent the polling results.

24. Write two differences between bar graph & histogram. (AVERAGE)

25. Define frequency polygon. How is it different from a histogram? (EASY)

IV. Answer the following questions. (Three marks questions)

26. For the following data draw a frequency polygon. (AVERAGE)

Marks	0 – 10	10 - 20	20 – 30	30 – 40	40 – 50
Frequency	3	9	17	12	9

27. The following table shows the heights of 50 students in a school. (AVERAGE)

Height(in cm)	140-145	145-150	150-155	155-160	160-165
Number of Student	6	12	18	10	04

Draw a frequency polygon.

28. The following table gives the life time of 400 neon lamps. (DIFFICULT)

Life time in hours	Number of lamps
300 – 400	14
400 – 500	56
500 – 600	60
600 – 700	86
700 – 800	74
800 – 900	62
900 – 1000	48

i. Represent the given information with the help of a histogram.

ii. How many lamps have a life span of more than 700 hours?

V. Answer the following questions. (Four marks questions)

29. Monthly income of the 40 families is shown below. (DIFFICULT)

A) Draw a histogram to represent this data.

B) Draw a frequency polygon on the same graph using mid points.

Income in ₹	Number of families
1000 - 2000	10
2000 - 3000	12
3000 - 4000	8
4000 - 5000	6
5000 - 6000	4

30. The following table shows the heights of 50 students in a school. (DIFFICULT)

Height in cm	140-145	145-150	150-155	155-160	160-165
No. of students	6	12	18	10	04

A) Draw a frequency polygon.

B) What can you infer about the heights of the students from graph?

31. The marks obtained by students in mathematics test are given below. (AVERAGE)

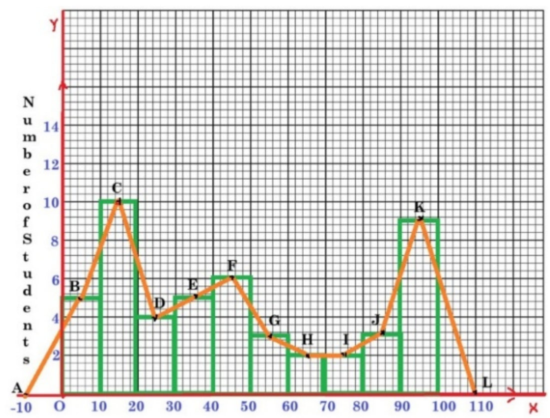
Marks	Number of students
0 - 10	4
10 - 20	8
20 - 30	10
30 - 40	6
40 - 50	2

a) Calculate the midpoint of each class.

b) Draw a frequency polygon for the data.

32. Marks scored by students in an examination for 100 marks is represented in frequency polygon as shown in the figure. Observe the graph & answer the following questions.

(DIFFICULT)



a) How many students score more than 40 marks?

b) How many students score 60 to 80 marks?

c) How many students score more than 90 marks?

d) If ≤ 40 is grade NC, how many are NC?

VI. Answer the following questions. (Five marks questions)

33. The following data shows the number of students who scored with in a range of 0-50 marks. Draw a histogram & frequency polygon on the same graph. (AVERAGE)

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Number of students	3	9	12	7	4

34. The following table gives the distribution of students of two sections according to the marks obtained by them. (DIFFICULT)

SECTION A		SECTION B	
MARKS	**FREQUENCY**	**MARKS**	**FREQUENCY**
0 - 10	3	0 - 10	5
10 - 20	9	10 - 20	19
20 - 30	17	20 - 30	15
30 - 40	12	30 - 40	10
40 - 50	9	40 - 50	1

Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the two polygons compare the performance of the two sections.

35. In a class, marks scored by 80 students (for 100 Marks) are given below.

Obtained Marks	10 – 20	20 – 30	30 – 50	50 – 70	70 – 100
Number of students	6	17	15	16	26

Draw a histogram for the given data.

[DIFFICULT]

ANSWER KEY

CHAPTER-1 NUMBER SYSTEM

I. Multiple choice questions

1. D) Irrational number
2. B) Real number
3. A) $\sqrt{25}$
4. D) $\sqrt{13}$
5. D) non terminating non-recurring
6. C) There are infinitely many rational numbers.
7. B) $9\sqrt{2}$
8. C) $3\sqrt{3}$
9. A) $\sqrt{5}-\sqrt{3}$
10. B) $2+5\sqrt{7}$
11. C) $\sqrt{3}-\sqrt{2}$
12. B) 2
13. C) 4
14. D) $\frac{2}{3}$
15. C) 1
16. A) m^6
17. C) 100
18. A) $\frac{1}{a^2b^2}$
19. D) 1
20. C) 256

II. One marks questions

21. A number can be expressed in the form of $\frac{p}{q}$ Where $p, q \in Z$ $q \neq 0$
22. A number cannot be expressed in the form of $\frac{p}{q}$
23. $\sqrt{3}$, π

24. Yes. $0 = \frac{0}{1} = \frac{p}{q}$ A rational number is a number that can be expressed in the form of $\frac{p}{q}$.

25. $= 2\sqrt{2} + 5\sqrt{3} + \sqrt{2} - \sqrt{3}$

$= 2\sqrt{2} + 1\sqrt{2} + 5\sqrt{3} - 1\sqrt{3}$

$= 3\sqrt{2} + 4\sqrt{3}$

26. $(6\sqrt{5})(2\sqrt{5})$

$= 6 \text{ x } 2\sqrt{5 \text{ x } 5}$

$= 12\sqrt{25}$

$= 12 \text{ x } 5$

$= 60$

27. $8\sqrt{15} \div 2\sqrt{3}$

$= \frac{4 \text{ x } 2\sqrt{5}\sqrt{3}}{2\sqrt{3}}$

$= 4\sqrt{5}$

28. $(\sqrt{11} - \sqrt{7})(\sqrt{11} + \sqrt{7})$

$= (\sqrt{11})^2 - (\sqrt{7})^2$

$= 11 - 7$

$= 4$

29. $(\sqrt[3]{27})^2$

$= (\sqrt[3]{3^3})^2$

$= \left(3^{\frac{3}{3}}\right)^2$

$= 3^2 = 9$

30. $\sqrt[3]{\sqrt{64}}$

$= \sqrt[3]{\sqrt{64}}$

$= \sqrt[3]{8}$

$= 2$

31. $64^{\frac{1}{2}} = (8^2)^{\frac{1}{2}} = 8$

32. $32^{\frac{2}{5}} = (2^5)^{\frac{2}{5}} = 2^2 = 4$

III. Two marks questions

33. Multiply and divide the number by 5

$1 = 1 \text{ x} \frac{5}{5} = \frac{5}{5}$

$2 = 2 \text{ x} \frac{5}{5} = \frac{10}{5}$

The 4 rational numbers between 1 and 2 is $\frac{6}{5}, \frac{7}{5}, \frac{8}{5}, \frac{9}{5}$

34. Rational numbers are $\sqrt{225}$, 7.478478.........

Irrational numbers are $\sqrt{23}$, 1.101001000100001...

35. Let $x = 0{,}333333333.......$ ___________(1)

Multiply eq 1 by 10

$10x = 3.33333333.......$ ___________(2)

Subtract (1) from (2)

$10x - 1x = 3$

$9x = 3$

$x = \frac{3}{9}$

$x = \frac{1}{3}$

$0.33333333........... = \frac{1}{3}$

36. Let $x = 0{,}999999.......$ ___________(1)

Multiply equation 1 by 10

$10x = 9.999999.......$ ___________(2)

Subtract (1) from (2)

$10x - 1x = 9$

$9x = 9$

$x = \frac{9}{9}$

$0.9999999 = 1$

37. Let x=0.121212……..__________(1)

Multiply equation (1) by 100

$100x = 12.1212.....$ ___________(2)

Subtract (1) from (2)

$100x - 1x = 12$

$99x = 12$

$x = \frac{12}{99} = \frac{4}{33}$

$0.1212.......... = \frac{4}{33}$

38. Let x= 2.123123123…….______(1)

Multiply equation (1) by 1000

$1000x = 2123.123123.....$ ___________(2)

Subtract (1) from (2)

$1000x - 1x = 2123 - 2$

$999x = 2121$

$x = \frac{2121}{999} = \frac{707}{333}$

$2.123123....... = \frac{707}{333}$

39. Let x=1.272727……..______(1)

Multiply equation 1 by 100

$100x = 127.2727.....$ ___________(2)

Subtract (1) from (2)

$100x - 1x = 127 - 1$

$99x = 126$

$x = \frac{126}{99} = \frac{14}{11}$

40. $5\sqrt{x} + 7\sqrt{y} + 12\sqrt{x} - 9\sqrt{y} - 8\sqrt{x} + 3\sqrt{y}$

$= 5\sqrt{x} + 12\sqrt{x} - 8\sqrt{x} + 7\sqrt{y} - 9\sqrt{y} + 3\sqrt{y}$

$= 9\sqrt{x} + 1\sqrt{y}$

41. $\sqrt{128}+\sqrt{50}-\sqrt{98}$

$\sqrt{64x2}+\sqrt{25x2}+\sqrt{49x2}$

$=8\sqrt{2}+5\sqrt{2}-7\sqrt{2}$

$\underline{=6\sqrt{2}}$

42. Find an irrational number between $\frac{1}{7}$ and $\frac{2}{7}$

$\frac{1}{7}=0.142857$

$\frac{2}{7}=0.285714$

Irrational number between $\frac{1}{7}$ and $\frac{2}{7}$ is 0.202122232425……..

43. It is in the form of $(a+b)^2=a^2+b^2+2ab$

$(\sqrt{3}+\sqrt{7})^2=(\sqrt{3})^2+(\sqrt{7})^2+2\sqrt{3}\sqrt{7}$

$(\sqrt{3}+\sqrt{7})^2=3+7+2\sqrt{21}$

$\underline{\underline{(\sqrt{3}+\sqrt{7})^2=10+2\sqrt{21}}}$

44. $(3+\sqrt{3})(2+\sqrt{2})$

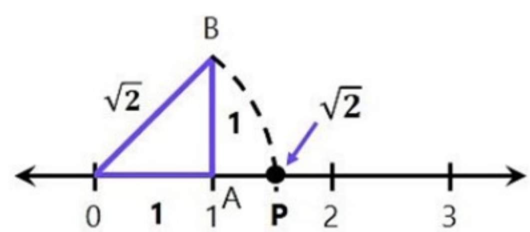
$(3+\sqrt{3})(2+\sqrt{2})$

$=3(2+\sqrt{2})+\sqrt{3}(2+\sqrt{2})$

$=\underline{\underline{6+3\sqrt{2}+2\sqrt{3}+\sqrt{6}}}$

IV. Three marks questions

45. $\sqrt{2}$ on the number line



To represent $\sqrt{2}$ on the number line,

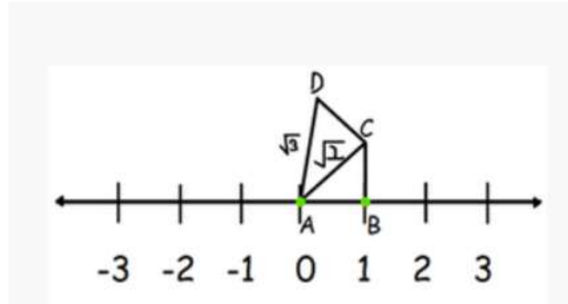
Let's consider an integer 2.

We can express 2 as the sum of squares of two numbers.

So, we have $2 = 1^2 + 1^2$

$\Rightarrow (\sqrt{2})^2 = 1^2 + 1^2$

46. $\sqrt{3}$ on the number line



let's consider an integer 2.

We can express 2 as the sum of squares of two numbers.

So, we have $2 = 1^2 + 1^2$

$\Rightarrow (\sqrt{2})^2 = 1^2 + 1^2$

Now $3 = \underline{\underline{(\sqrt{3})^2 = (\sqrt{2})^2 + 1^2}}$

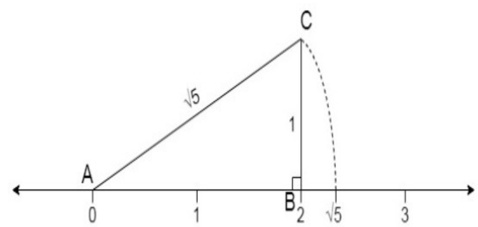
47. Locate $\sqrt{5}$ To represent $\sqrt{5}$ on the number line,

Let's consider an integer 5.

We can express 5 as the sum of squares of two numbers.

So, we have $5 = 2^2 + 1^2$

$\Rightarrow (\sqrt{5})^2 = 2^2 + 1^2$



48. $(9)^{\frac{3}{2}} = \left((3)^2\right)^{\frac{3}{2}} = 3^{2*\frac{3}{2}} = 3^3 = 27$

$(125)^{\frac{2}{3}} = ((5)^3)^{\frac{2}{3}} = 5^{3\times\frac{2}{3}} = 5^2 = 25$

$(16)^{\frac{3}{4}} = ((2)^4)^{\frac{3}{4}} = 5^{4\times\frac{3}{4}} = 2^3 = 8$

49. $\frac{1}{7+3\sqrt{2}}$

$$\frac{1}{7+3\sqrt{2}} = \frac{1}{7+3\sqrt{2}} * \frac{7-3\sqrt{2}}{7-3\sqrt{2}}$$

$$= \frac{7-3\sqrt{2}}{7^2-(3\sqrt{2})^2}$$

$$= \frac{7-3\sqrt{2}}{49-9x2}$$

$$= \frac{7-3\sqrt{2}}{49-18}$$

$$= \underline{\frac{7-3\sqrt{2}}{31}}$$

50. $\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

$\frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}} x \frac{\sqrt{5}+\sqrt{3}}{\sqrt{5}+\sqrt{3}}$

$= \frac{(\sqrt{5}+\sqrt{3})^2}{(\sqrt{5})^2-(\sqrt{3})^2}$

$= \frac{(\sqrt{5})^2+(\sqrt{3})^2+2\sqrt{5}\sqrt{3}}{5-3}$

$= \frac{5+3+2\sqrt{15}}{2}$

$= \frac{8+2\sqrt{15}}{2}$

$= \frac{2(4+\sqrt{15})}{2}$

$= \underline{4+\sqrt{15}}$

51. $\frac{36}{100} = 0.36 = ter\min ating\ decimal\ \exp ansion$

$\frac{1}{11} = 0.090909\ldots\ldots = 0.\bar{9} = non-ter\min ating\ recurring\ decimal\ \exp ansion$

$4\frac{1}{8} = \frac{33}{8} = 4.125\ ter\min ating\ decimal\ \exp ansion$

V. Four marks questions

52. Using Pythagoras theorem

$OD^2 = BD^2 + OB^2$

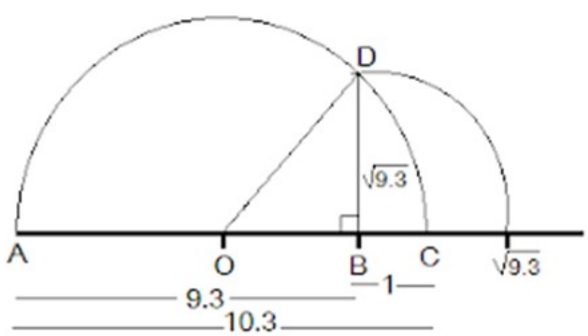
$\left(\frac{10.3}{2}\right)^2 = BD^2 + \left(\frac{8.3}{2}\right)^2$

$BD^2 = (5.15)^2 - (4.15)^2$

$BD^2 = (5.15+4.15)(5.15-4.15)$

$BD^2 = 9.3(1) = 9.3$

$\underline{\underline{BD = \sqrt{9.3}}}$



53.

i) True because every natural number is present in the set of whole numbers

ii) False because an integer can be positive or negative whereas whole numbers are only positive

iii) False because Natural numbers are positive integers while irrational numbers are real numbers that cannot be expressed as a fraction.

iv) False because the square roots of all positive integers are both rational and irrational

VI. Five marks question

54. Laws of exponents are

a) $a^m a^n = a^{m+n}$

b) $\frac{a^m}{a^n} = a^{m-n}$

c) $(ab)^m = a^m b^m$

d) $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

d) $\left[(a)^m\right]^n = a^{mn}$

CHAPTER-2. POLYNOMIALS

I. Multiple choice questions.

1. A) $4x^2+2x-1$
2. D) 9
3. A) Linear polynomial
4. B) Quadratic polynomial
5. C) Cubic Polynomial
6. B) Linear polynomial
7. C) Quadratic polynomial
8. A) x^2+2x+4
9. A) $2x+5$
10. B) ax^2+bx+c
11. D) 7
12. A) 0
13. A) 0
14. D) 1
15. C) -1and 1
16. C) 120
17. D) 96
18. D) $(2x-1)$
19. B) 2
20. C) –360
21. A) 9984
22. B) x^2+5x+6
23. A) $(x+1)$ and $(x+6)$
24. A) $(x-4)$
25. B) Linear polynomial
26. D) - 3
27. A) 3
28. C) 7
29. A) 2
30. B) 9

II. One marks questions

31. Binomial term:An expression having two terms Ex: x^2-9x
32. Linear polynomial: A linear polynomial is a polynomial with a degree of 1.Ex: $2x-3$
33. Quadratic polynomial: A Quadratic polynomial is a polynomial with a degree of 2

Ex: x^2-3x-6

34. The degree is zero
35. $(m+n)(m-n)=m^2-n^2$

36. Factors of $x^2 + (a+b)x + ab$ are $x + a$ and $x + b$

37. The coefficient of x^2 is -1

38. $p(x) = 5x^2 - 3x + 7$ at x=1

$p(x) = 5x^2 - 3x + 7$

$p(1) = 5(1)^2 - 3(1) + 7$

$p(1) = 5(1) - 3 + 7$

$p(1) = 5 + 4 = 9$

39. When a polynomial, f(x), is divided by a linear polynomial, (x - a), the remainder is equal to f(a).

40. Yes, the zero of the zero polynomial is any real number. The zero polynomial is defined as a polynomial with all coefficients equal to zero.

41. $p(x) = cx + d = 0$

$x = \frac{-d}{c}$

42. $p(x) = 5x - \pi$

$p\left(\frac{4}{5}\right) = 5\left(\frac{4}{5}\right) - \pi = 4 - \pi \neq 0$

$x = \frac{4}{5}$ is not a zeroes of a polynomial

43. It is in the form of $(a-b)^2 = a^2 + b^2 - 2ab$

$(2a - 3b)^2 = (2a)^2 + (3b)^2 - 2(2a)(3b)$

$(2a - 3b)^2 = 4a^2 + 9b^2 - 12ab$

44. If $m + n + p = 0$ then the value of $m^3 + n^3 + p^3 = 3mnp$

III. Two marks questions

45. Binomial of degree 35 is $6x^{35} - 50$

Monomial of degree 100 is $25x^{100}$

46.

$p(x) = (x^2 - 2x)$

When x= -2 $p(-2) = (-2)^2 - 2(-2)$

$p(-2) = 4 + 4 = 8 \neq 0$

$\therefore$ -2 is not a zeroes of the polynomial $(x^2 - 2x)$

$p(x) = (x^2 - 2x)$

When x= 2 $p(2) = (2^2 - 2 * 2)$

$p(2) = 4 - 4 = 00$

$\therefore$ 2 is a zeroes of the polynomial $(x^2 - 2x)$

47. If x+2=0 then x= -2

$p(x) = x^3 + 3x^2 + 5x + 6$

$p(-2) = (-2)^3 + 3(-2)^2 + 5(-2) + 6$

$= -8 + 3(4) - 10 + 6$

$= -12 + 12$

$= 0$

$\therefore x + 2$ is a factor of $x^3 + 3x^2 + 5x + 6$

48. Factors of 6 are 1, 2 and 3

By trial, we find that p(2) = 0. hence y – 2 is a factor of p(y).

$p(y) = y^2 - 5y + 6$

$p(y) = y^2 - 2y - 3y + 6$

$p(y) = y(y-2) - 3(y-2)$

$p(y) = (y-2)(y-3)$

49.

$p(x) = 4x^3 + 3x^2 - 4x + k$

If $(x-1)$ is a factor then $(x-1) = 0 \Rightarrow x = 1$

$p(1) = 4(1)^3 + 3(1)^2 - 4(1) + k = 0$

$4(1) + 3(1) - 4(1) + k = 0$

$4 + 3 - 4 + k = 0$

$k = -3$

50.

$(x+a)(x+b) = x^2 + (a+b)x + ab$

$(x+4)(x+10) = x^2 + (4+10)x + (4)(10)$

$(x+4)(x+10) = x^2 + 14x + 40$

51. $(x+y)^2 + (x-y)^2$

$= x^2 + y^2 + 2xy + x^2 + y^2 - 2xy$

$= 2x^2 + 2y^2$

52.

$49a^2 + 70ab + 25b^2$

$= (7a)^2 + 2x7ax5b + (5b)^2$

It is in the form of $a^2 + 2ab + b^2 = (a+b)^2$

$49a^2 + 70ab + 25b^2 = (7a + 5b)^2$

53. $104^3 = (100+4)^3$

It is in the form of $(x+y)^3 = x^3 + y^3 + 3xy(x+y)$

$(100+4)^3 = 100^3 + 4^3 + 3(100)(4)(100+4)$

$104^3 = 1000000 + 64 + 1200(104)$

$104^3 = 1000064 + 124800$

$104^3 = 1124864$

54. It is in the form of $(x+a)(x+b)=x^2+(a+b)x+ab$

$(100+5)(100+6)=100^2+(5+6)100+5X6$

$105X106=10000+11X100+30$

$105X106=10030+1100$

$105X106=11130$

55. $27y^3+125z^3=(3y)^3+(5z)^3$

It is in the form of $a^3+b^3=(a+b)(a^2+b^2-ab)$

$(3y)^3+(5z)^3=(3y+5z)\left[(3y)^2+(5z)^2-(3y)(5z)\right]$

$(3y)^3+(5z)^3=(3y+5z)\left[9y^2+25z^2-15yz\right]$

56. $(3a+4b+5c)^2$ is in the form of $(a+b+c)^2$

$(a+b+c)^2=a^2+b^2+c^2+2ab+2bc+2ca$

$(3a+4b+5c)^2=(3a)^2+(4b)^2+(5c)^2+2(3a)(4b)+2(4b)(5c)+2(5c)(3a)$

$(3a+4b+5c)^2=9a^2+16b^2+25c^2+24ab+40bc+30ac$

57. $l=(x+12)$ and $b=(x-7)$.

Area of the rectangular blackboard= length * breadth

A= lb

$=(x+12)(x-7)$

It is in the form of $(x+a)(x+b)=\text{x}^2+(a+b)\text{x}+ab$

$(\text{x}+12)(\text{x}-7)=\text{x}^2+(12-7)\text{x}+(12)(-7)$

$(\text{x}+12)(\text{x}-7)=(\text{x}^2+5\text{x}-84)\text{SqUnits}$

IV. Three marks questions

58.

Linear Polynomials	$1+x$, $3t$,
Quadratic Polynomials	x^2+x, y^2+y+4, r^2
Cubic Polynomials	$x-x^3$, $7x^3$

59.

Given $x+y+z=0$

$x+y=-z$

Cube on both sides

$(x+y)^3=(-z)^3$

$\left(x^3+y^3+3xy(x+y)\right)=-z^3$

$x^3+y^3+3xy(-z)+z^3=0 \because x+y=-z$

$x^3+y^3-3xyz+z^3=0$

$x^3+y^3+z^3=3xyz$

60. $8x^3+27y^3+36x^2y+54xy^2$

$=(2x)^3+(3y)^3+3(12x^2y+18xy^2)$

$=(2x)^3+(3y)^3+3(2x)(3y)(2x+3y)$

$=(2x+3y)^3 \because x^3+y^3+3xy(x+y)=(x+y)^3$

61.
$l=(x+10)$, $b=(x+4)$ and $h=(x-6)$.
Volume of a cuboidal tank= volume of a cuboid
=*lbh*

$=(x+10)(x+4)(x-6)$

We know that $(x+a)(x+b)(x+c)=x^3+(a+b+c)x^2+(ab+bc+ca)x+abc$

$(x+10)(x+4)(x-6)$

$=x^3+(10+4-6)x^2+[(10\text{x}4)+(4\text{x}-6)+(-6\text{x}10)]x+10\text{x}4\text{x}-6$

$(x+10)(x+4)(x-6)=x^3+8x^2+[40-24-60]x-240$

$(x+10)(x+4)(x-6)=x^3+8x^2-44x-240$ *Cubic units*

V. Four marks questions

62. Factorise $x^3-23x^2+142x-120$

Sol : we shall now look for all the factors of -120. Some of these are
±1, ±2, ±3, ±4, ±5, ±6, ±8, ±10, ±12, ±15, ±20, ±24, ±30, ±60.
By trial, we find that p(1) = 0. hence x – 1 is a factor of p(x).

Now we see that $x^3-23x^2+142x-120 = x^3-x^2-22x^2+22x+120x-120$

$=x^2(x-1)-22x(x-1)\ \ +120(x-1)$

$=(x-1)(x^2-22x+120)$

Now $(x^2-22x+120)$ can be factorised either by splitting the middle term or by using the Factor theorem. By splitting the middle term, we have

$(x^2-22x+120)=x^2-12x-10x+120$

$=x(x-12)-10(x-12)$

$=(x-12)(x-10)$

So $x^3-23x^2+142x-120=(x-1)(x-12)(x-10)$

63.

a) We know that: $(x+y)^3=x^3+y^3+3xy(x+y)$

$x^3+y^3=(x+y)^3-3xy(x+y)$

$x^3+y^3=(x+y)\left[(x+y)^2-3xy\right]$

$x^3+y^3=(x+y)\left[x^2+y^2+2xy-3xy\right]$

$x^3+y^3=(x+y)\left[x^2+y^2+2xy-3xy\right]$

$\underline{\underline{x^3+y^3=(x+y)\left[x^2+y^2-xy\right]}}$

b) We know that: $(x-y)^3 = x^3 - y^3 - 3xy(x-y)$

$x^3 - y^3 = (x-y)^3 + 3xy(x-y)$

$x^3 - y^3 = (x-y)\left[(x-y)^2 + 3xy\right]$

$x^3 - y^3 = (x-y)\left[x^2 + y^2 - 2xy + 3xy\right]$

$x^3 - y^3 = (x-y)\left[x^2 + y^2 + xy\right]$

VII. Five marks questions

64. LHS= $x^3 + y^3 + z^3 - 3xyz$

$$= (x^3 + y^3) + z^3 - 3xyz$$
$$= (x+y)^3 - 3xy(x+y) + z^3 - 3xyz$$
$$= \left[\left((x+y)^3 + z^3\right) - 3xy(x+y) - 3xyz\right]$$
$$= (x+y+z)^3 - 3z(x+y)(x+y+z) - 3xy(x+y+z)$$
$$= (x+y+z)\left[(x+y+z)^2 - 3z(x+y) - 3xy\right]$$
$$= (x+y+z)\left(x^2 + y^2 + z^2 + 2xy + 2yz + 2zx - 3xz - 3zy - 3xy\right)$$
$$= (x+y+z)\left(x^2 + y^2 + z^2 - xz - zy - xy\right)$$
$$= \frac{1}{2}(x+y+z)2\left(x^2 + y^2 + z^2 - xz - zy - xy\right)$$
$$= \frac{1}{2}(x+y+z)\left(2x^2 + 2y^2 + 2z^2 - 2xz - 2zy - 2xy\right)$$
$$= \frac{1}{2}(x+y+z)\left(x^2 + x^2 + y^2 + y^2 + z^2 + z^2 - 2xz - 2zy - 2xy\right)$$
$$== \frac{1}{2}(x+y+z)\left(x^2 + y^2 - 2xy + y^2 + z^2 - 2zy + x^2 + z^2 - 2xz\right)$$
$$= \frac{1}{2}(x+y+z)\left[(x-y)^2 + (y-z)^2 + (z-x)^2\right]$$
$$= RHS$$

65.

a) $(a+b)^2 = a^2 + 2ab + b^2$

b) $(a-b)^2 = a^2 - 2ab + b^2$

c) $(a+b+c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca$

d) $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$

e) $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$

66.

a) $a^2 - b^2 = (a+b)(a-b)$

b) $a^3 + b^3 = (a+b)(a^2 + b^2 - ab)$

c) $a^3 - b^3 = (a-b)(a^2 + b^2 + ab)$

d) $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - ac - bc)$

e) $a^4 + a^2b^2 + b^4 = (a^2 + ab + b^2)(a^2 - ab + b^2)$.

CHAPTER-3 COORDINATE GEOMETRY

I. Multiple choice questions

1. C) (0, 0)
2. A) 4 units
3. B) I and IV quadrants
4. C) x– axis
5. C) III quadrant
6. C) Origin
7. D) S
8. D) II
9. C) y-axis
10. A) (– x, – y)
11. B) Square
12. D) 0
13. B) (4, 0)
14. C) I and II quadrants
15. D) 2
16. C) T
17. D) (– 2, 3) (3, 2) (– 2, – 3) (3, – 2)
18. B) 2

II. One marks questions

19. (– 4, 0)
20. III quadrant
21. (0, 0)
22. abscissa is 6 and ordinate is – 3
23. II quadrant
24. (– 3, 5)
25. y – axis
26. (0, 7)

III.Two marks questions

27. a) Horizontal line: **x– axis**

b) Vertical line: **y– axis**

c) The point of intersection of two axes: **Origin**

d) Each part of the plane divided by two axes: **Quadrant**

28. The Point (– 3, 5) lies in **II quadrant**

The Point (2, –2) lies in **IV quadrant**

The Point (–3, 0) lies on **x-axis**

The Point (–4, –6) lies in **III quadrant**

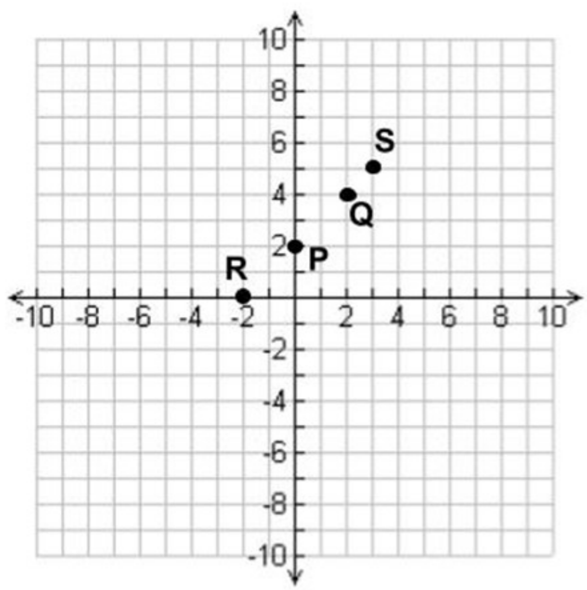
29. a) Lying on x– axis with x coordinate 5 **(5,0)**

b) Lying on y-axis with y coordinate – 2 **(0, –2)**

30. A (–3, 0) B (0, 2) C (–1, 4) D (2, 3)

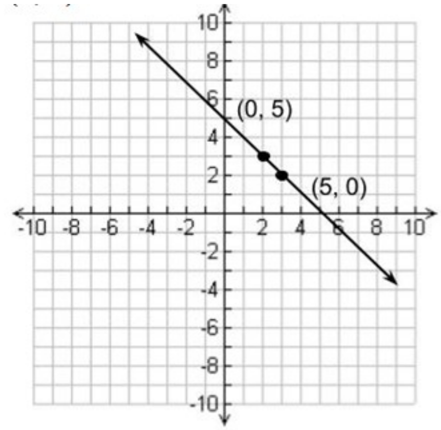
IV. Three marks questions

31.



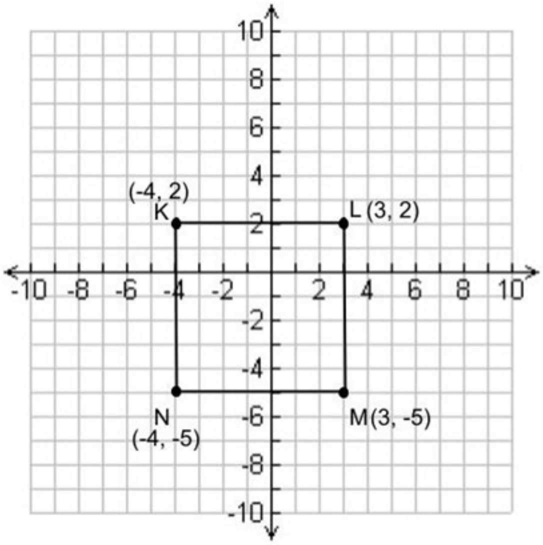
32. The coordinates of the point at which this line intersects x-axis are (5, 0) and

The coordinates of the point at which this line intersects y-axis are (0, 5)



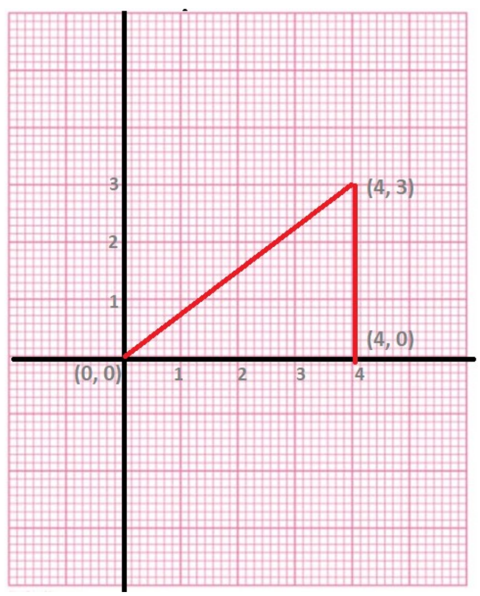
V. Four marks questions

33.



The coordinates of N are (-4, -5)

34.



Area of closed triangle in graph = $\frac{1}{2}$ x base x height

base = 4 units

height = 3 units

Area = $\frac{1}{2}$ x 4 x 3

Area = 6 square units

CHAPTER-4 LINEAR EQUATION IN TWO VARIABLES

I. Multiple choice questions

1) B) $ax + by + c = 0$
2) C) Infinitely many solutions
3) A) I quadrant
4) D) (4, 0)
5) A) 6
6) C) (a, a)
7) C) $x + y = 7$
8) B) $ax^2 + by = c$
9) D) Infinite
10) A) $(\frac{-7}{3}, 3)$
11) C) $x + y = 181$

II. One marks questions

12) $2x+y=8$
13) No
14) $y=3$
15) If $x=0$ then $y=5$. The solution is (0, 5)
16) $3x - y - 7 = 0$
17) $3(2) - (-1) = 7$, yes this point lies on the given line
18) $y=a$
19) $y=mx$
20) $5x - 2y - 2 = 0$

III. Two marks questions

21) Standard form is $2x - 6y - 8 = 0$ here $a=2$, $b=-6$ and $c=-8$
22) $5x + 2y - 2 = 0$

$a+b+c = 5+2-2 = 5$

23) point (3, 4) lies on the line $3y = px + 7$, so by substituting $x=3$ and $y=4$

$3(4) = p(3) + 7$

$p = \frac{5}{3}$

24) $3x+4y=k$, here $x=3$ and $y=2$

$3(3) + 4(2) = k$ $k = 17$

25) $4x + 3y= 12$

Point cuts the x-axis means $y=0$

$4x + 3(0) = 12$

$x = 3$. So, the point is (3, 0)

Point cuts the y-axis means $x=0$

$4(0) + 3y = 12$

$y = 4$, so the point is (0, 4)

IV.Three marks questions

26) $x + 2y = 6$

a) (1, 2) $x=1$ and $y=2$

$1 + 2(2) = 5$. This is not a solution.

b) (2, 2) $x=2$ and $y=2$

$2 + 2(2) = 6$. This is a solution

c) (0, 3) $x=0$ and $y=3$

$0 + 2(3) = 6$.This is a solution.

27) Distance travelled is 9 km

Amount to be paid is y

Amount for the first km is Rs. 25 and $x=8$

So, the equation is $25 + 15x = y$

$y = 25 + 15(8)$

$y = 145$

Amount to be paid is Rs.145

28) $3x + y - 12 = 0$

$y = 12 - 3x$

If $x = 0$, $y = 12 - 3(0) = 12$ So the solution is (0, 12)

If $x = 1$, $y = 12 - 3(1) = 9$ So the solution is (1, 9)

If $x = 2$, $y = 12 - 3(2) = 6$ So the solution is (2, 6)

If $x = -2$, $y = 12 - 3(-2) = 18$ So the solution is (-2, 18)

CHAPTER-5 INTRODUCTION TO EUCLID'S GEOMETRY

I. Multiple choice questions

1. (A) Theorem

2) (C) Greece

3. (A) Equal to one another

4. (A) Universal truths without need for any proof.

5. (A) solids-surfaces-lines-points

6. (B) Curves

7. (A) 13 chapters

8. (D) the whole is lesser than its part

9. (C) A terminated line can be produced indefinitely on both sides

10. (A) Things which are equal to the same thing are equal to one another

11. (D) any polygon

12.(A) Triangles

13.(B) 4 :2 : 1

14.(A) 0

II. One marks questions

15. A straight line may be drawn from any one point to any other point

16. A location with no length, width or thickness

17. A part of a line that starts at a point and extends Infinity in one direction

18. It leads to the development of non Euclidian geometry

19. A flat two dimensional surface that extends Infinity in all directions

20. Line segment

21. One

22. Perpendicular lines are two lines that intersect to form a right angle.

23. The elements

24. One

III.Two marks questions

25.

Axioms	Postulates
1) An axiom is a self evident truth 2) It requires no proof 3) Applicable to all the branches of Mathematics	1) An postulate is not self evident 2) It is a statement that is assumed to be True in order to prove other statements 3) Applicable to only Geometry

26. Let x kg be the weight of each of Ram and Ravi

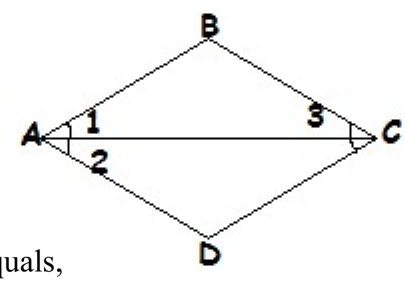
on adding 2kg

The weight of Ram and Ravi be (x+2) kg each

According to Euclid's second axiom the whole are equal when equals are added to equals

So, the weight of Ram and Ravi are equal.

27.



$\angle 1 = \angle 3$ --------------- (i) (Given)

And $\angle 2 = \angle 4$---------- (ii)

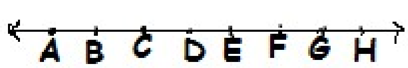
According to Euclid's axioms 2, if equals are added to equals,

then wholes are also equal on adding equations (i) and (ii) we get

$\angle 1 + \angle 2 = \angle 3 + \angle 4$

$\angle A = \angle C$

28.



We acquire

AH=AB+BC+CD+DE+EF+FG+GH

AB+BC+CD is a component of AH

AS per Euclid's axiom, "The whole is greater than the part

AH>AB+BC+CD

∴The length AH> sum of lengths of AB+BC+CD

29. i) Perpendicular lines:

Perpendicular lines are those lines which never intersect each other and are always at a constant perpendicular distance between each other.

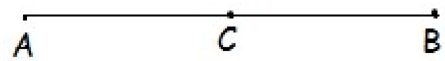
ii) Line segment: Part of a line with two end points is called line segment.

30. a)**Collinear points**: Points that lie on the same line are called collinear points.

b)**Non-collinear points:** Points that do not lie on the same line are called collinear points.

IV. Three marks questions

31.



Data: In figure AC=BC

To prove: AC=$\frac{1}{2}$AB

Proof: AC=BC (given)

Now adding AC both sides

LHS+AC=RHS+AC

AC+AC=BC+AC

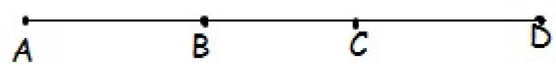
2AC=BC+AC

We know that BC+AC=AB (As it coincides with line segment AB)

2AC=AB (If equals are added to equals the wholes are equal)

AC=$\frac{1}{2}$AB

32.



Data: AB=CD

To prove: AB=CD

Proof: AC=BD (Given)

AC=AB+BC

BD=BC+CD

AB+BC=BC+CD (AC=BD Given)

According to Euclid's axiom, when equals are subtracted from equals remainders are also equal

AB+BC–BC = BC+CD–BC

AB = CD Hence proved.

33. i) **False**,

There can be infinite number of lines that can be drawn through a single point. Hence the statement mentioned is false.

ii) **False**,

Through two distinct points, there can be only one line that can be drawn. Hence the statement mentioned is false.

iii) **True**, The circles coincide, and thus the radius of the two circles should be equal. Hence the statement mentioned is true; the radii of two circles are equal when the two circles are equal. The circumference and the centre of both.

V. Five marks questions

34.

1. Things which are equal to the same thing are equal to one another.
2. If equals are added to equals, the wholes are equal.
3. If equals are subtracted from equals, the remainders are equal.
4. Things which coincide with one another are equal to one another.
5. The whole is greater than the part.
6. Things which are double of the same things are equal to one another.
7. Things which are halves of the same things are equal to one another.

35.

Euclid's Postulate 1: A straight line may be drawn from anyone point to any other point.

Euclid's Postulate 2: A terminated line can be produced indefinitely.

Euclid's Postulate 3: A circle can be drawn with any center and any radius.

Euclid's Postulate 4: All right angles are equal to one another.

Euclid's Postulate 5: If a straight line falling on two straight lines makes the interior angles on the same side of it taken together less than two right angles, then the two straight lines, if produced indefinitely, meet on that side on which the sum of angles is less than two right angles.

36.

i) AC and CD

ii) QL and RB

iii) C,D,Q and S

iv) AB ǁ CS

v) AB ǁ CS

CHAPTER-6 LINES AND ANGLES

I. Multiple choice questions

1. (C) 95^0

2. (D) 60^0, 30^0

3. (C) Linear pair angles

4. (B) Adjacent angles are always supplementary

5. (C) 108^0

6. (B) 86^0

7. (A) Through a given point, only one straight line can be drawn

8. (C) 120^0

9. (C) 180^0

10. (A) right angle

11. (A) equal

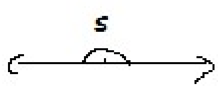
12. (B) straight angle

13.(A) W

14. (B) Angle bisector

15. (D)270^0

16. (D)



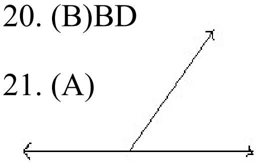
17. (B)2

18. (D)4

19. (D)2

20. (B)BD

21. (A)



22. (A) 45^0

23. (C)60^0

24. (B)$\angle$AOC=$\angle$DOB

25. (C)$\angle$DOB &$\angle$DOA

26. (B) 60^0

27. (D)60^0

28. (D) 60^0

29. (B) 180^0

30. (B) 70^0

31 (A) 25^0

32. (A) line segment

33.(C)More than 180^0 and less than 360^0

34. (D) Nill

35.(B) An acute angle triangle

II.One marks questions

36.180^0-120^0 =60^0

37. $l \parallel n$ because lines which are parallel to the same line are parallel to each other

38.$\angle$DOB=$\angle$COA =60^0 (vertically opposite angle)

$\therefore \angle$COA= 60^0

39. 55+ 3a+115–2a =180

a+170=180

$\therefore$ a=10

40.The angle lie between 90^0 to180^0 is called obtuse angle

41.Three are more points lie on the same line is called collinear points

42. Reflex$\angle$ABC=360^0–142^0

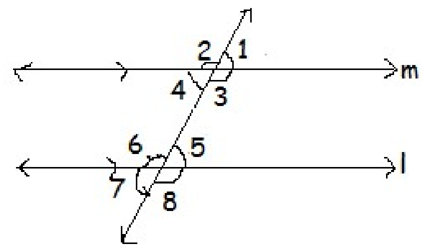
$\angle$ABC = 218^0

43.180^0–75^0 =**105^0**

44. False

III. Two marks questions

45.



Yes $m||n$

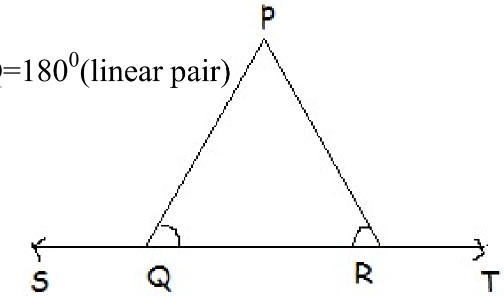
Given $\angle 2 = 130^0 = \angle 3$ (V.O.A)

$\angle 3 + \angle 5 = 130^0 + 50^0 = 180^0$

Since sum of the interior angles of the same side of the transversal is 180^0

$\therefore$ **m||n**

46.



Since ST is a straight line

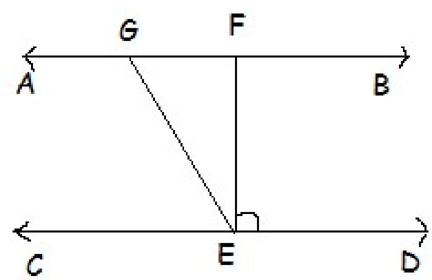
So, $\angle PQS + \angle PQR = 180^0$(linear pair) and$\angle PRT + \angle PRQ = 180^0$(linear pair)

Now$\angle PQS + \angle PQR = \angle PRT + \angle PRQ = 180^0$

Since $\angle PQR = \angle PRQ$(given)

$\angle$**PQS=**$\angle$**PRT** Hence proved

47.



Since AB||CD, GE is a transversal $\angle GED = 126^0$ (given)

So $\angle GED = \angle AGE = 126^0$(alternate interior angles)

Also,$\angle GED = \angle GEF + \angle FED$

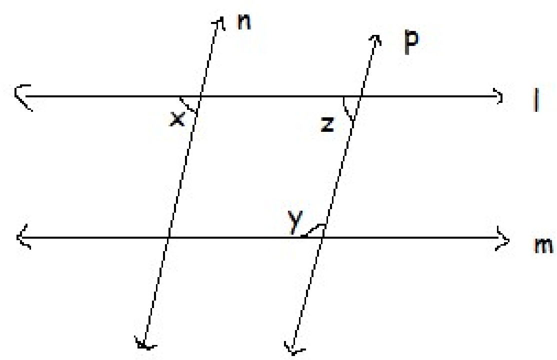
As EF$\perp$CD, $\angle FED = 90^0$

$\therefore \angle GED = \angle GEF + 90^0$

$\angle GED = 126^0 - 90^0$

$\angle$**GED=36**^{0}

48.



Given $l||m$ and $n||p$

$\angle$**X=85**^{0}

$\angle X = \angle$**Z=85**^{0}(Corresponding angles)

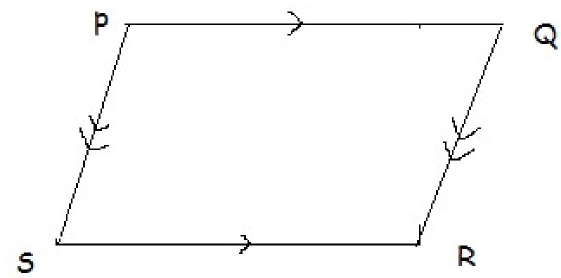
$\angle Y + \angle Z = 180^0$

$\angle Y + 85^0 = 180^0$

$\angle$**Y=95**^{0}

49.

In the fig



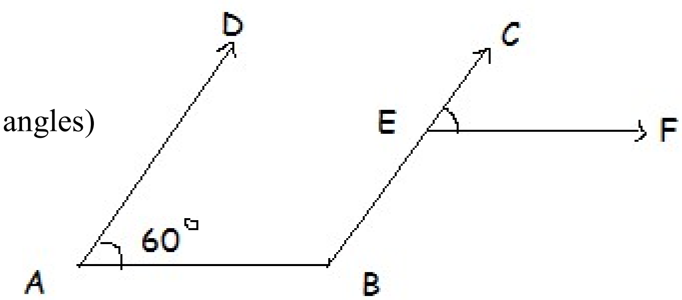
$\angle SPQ + \angle PSR = 180^0$---------------- (1) (PQ || SR)

$\angle SRQ + \angle PSR = 180^0$————————(2) (PS || QR)

Equating (1) & (2) we get

$\angle SPQ = \angle SRQ$

50.



Solution: $\angle DAB + \angle CBA = 180^0$ (Co-interior angles)

$60^0 = \angle CBA = 180^0$

$\angle CBA = 120^0$

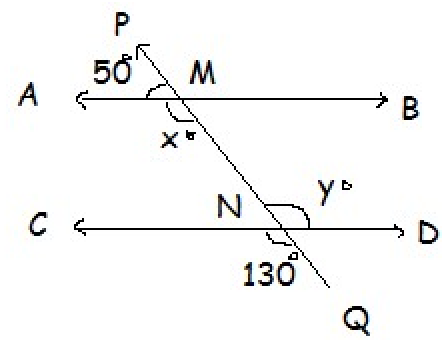
$\angle ABE = \angle BEF = 120^0$ (Alternate angles)

Now $\angle BEF + \angle CEF = 180^0$ (linear pair)

$120^0 + \angle CEF = 180^0$

$\angle CEF = 60^0$

51.



Solution: $\angle PMA + \angle AMN = 180$ (linear pair)

$50 + x = 180^0$

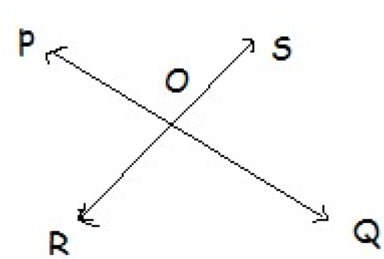
$X = 130^0$

$\angle CNQ = \angle MND = 130$ (Vertically opposite angles)

$130^0 = y$

$Y = 130^0$

52.



Solution: $\angle POR = \frac{5}{12} x 180 = 75^0$

$\angle ROQ = \frac{7}{12} x 180 = 105^0$

Now **$\angle POS = \angle ROQ = 105^0$** (Vertically opposite angles)

And **$\angle SOQ = \angle POR = 75^0$**

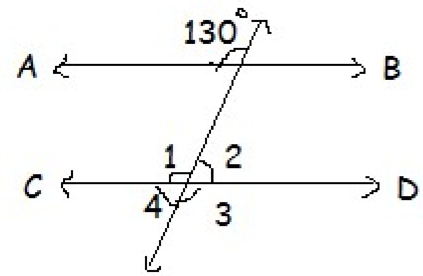
53.

Solution: $\angle 1 = 130^0$ (corresponding angles)

$\angle 3 = 130^0$(vertically opposite angles)

$\angle 4 = 180^0 - 130^0 = 50^0$(linear pair angles)

$\angle 2 = 50^0$(vertically opposite angles)



54.

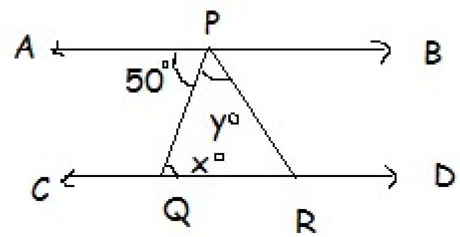
Solution: AB||CD

$X = \angle APQ = 50^0$ interior alternate angles)

$\angle APR = \angle PRD$ (interior alternate angles)

$Y = 127^0 - 50^0 = 77^0$

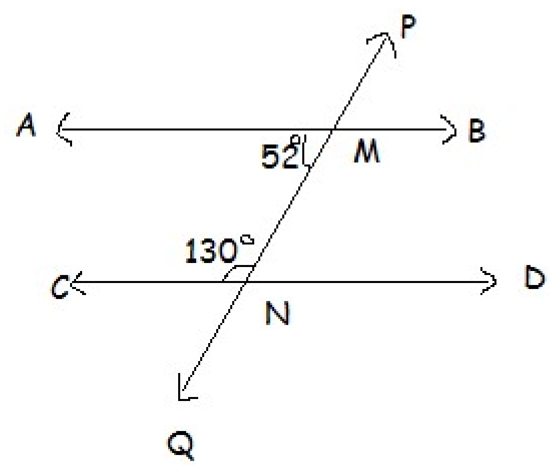
$X = 50^0$ & $Y = 77^0$



55.

Solution: $130^0 + 52^0 = 182^0$

AB not parallel to CD (sum of the angles of same side of the transversal are not equal)



56.

Data: In figure X+Y=W+Z

To prove: AOB is a straight line (or) $X + Y = 180^0$

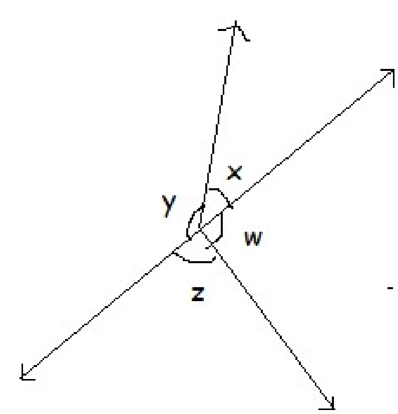
Proof: $X + Y + W + Z = 360^0$ (Angle around a point are 360^0)

$(X+Y) + (W+Z) = 360^0$

$2(X+Y) = 360^0$

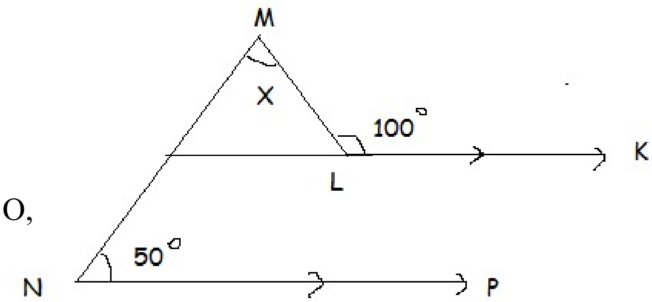
$X + Y = 180^0$

∴AOB is a straight line



IV. Three marksquestions

57.



Given $\angle MLK=100^0 \angle MNP=50^0$

In the fig LK||NP Extend KL to meet MN at O,

$\angle MOL=\angle MNP$ (Corresponding angles)

$\therefore \angle MOL=50^0$

$\angle MLO+\angle MLK=180^0$(linear pair)

$\angle MLO+100^0=180^0$

$\angle MLO=80^0$

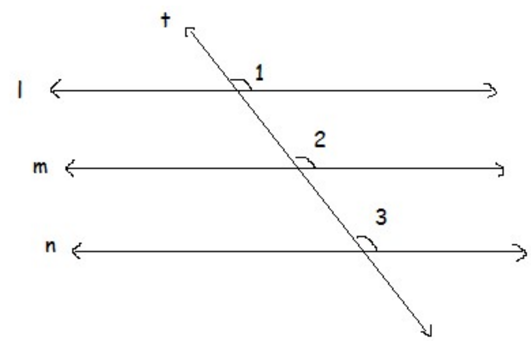
In ΔMOL,

$\angle MOL+\angle MLO+\angle OML=180^0$

$50^0+80^0+X=180^0$

$X=50^0$

58.



Data: $m||l$ and $n||l$

To prove: $m||n$

Construction: Draw a transversal 't'

Proof: $\angle 1=\angle 2$ (Corresponding angles l||m)

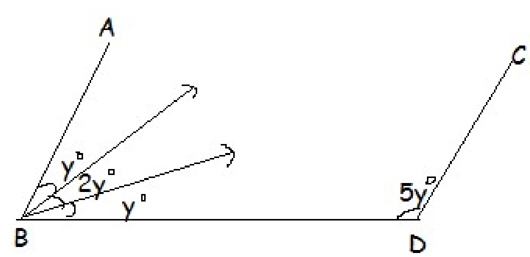
$\angle 1=\angle 3$ (Corresponding angles n||l)

From the above $\angle 2=\angle 3$

But this is a pair of corresponding angles

Hence*m*||*n*

59.



In figure

AB||CD (given)

$\angle ABD+\angle CDB=180^0$(sum of the same side of the transversal is equal to 180^0)

$y^0+2y^0+y^0+5y^0=180^0$

$9y^0=180^0$

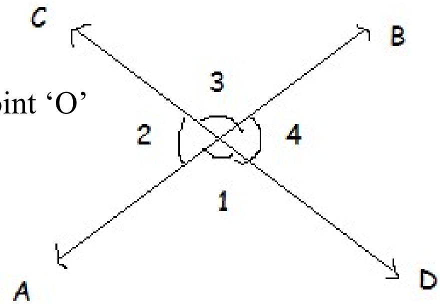
$y^0=20^0$

$\therefore \angle CDB=5y^0$

$=5x20$

$\angle CDB=100^0$

60.



Given: Two lines AB &CD intersect each other at the point ‘O’

To prove: $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$

Proof: In fig

$\angle 1+\angle 2=180$ -------------------------(1)(linear pair angles)

$\angle 2+\angle 3=180$ -------------------------(2)

From (1) &(2)

$\angle 1+\angle 2=\angle 2+\angle 3$

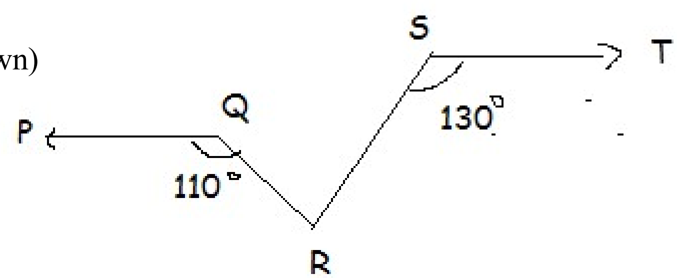
$\angle 1=\angle 3$

Similarly

$\angle 2=\angle 4$

$\angle 1=\angle 3$&$\angle 2=\angle 4$

61.



Solution: $\angle RST+\angle SRB=180^0$ (AB||ST Drawn)

$\angle SRB=180^0-130^0=50^0$

$\angle SRB=50^0$

PQ||ST

PQ||AB

$\angle QRB=\angle PQR=110^0$(Alternate angles)

$\angle QRS+\angle SRB=\angle PQR$

$\angle QRS+50^0=110^0$

$\angle QRS=110^0-50^0$

$\angle QRS=60^0$

62.

Solution: $\angle XYZ=64$ (YQ bisects $\angle ZYP$)

$\angle XYP=180$

$\angle ZYQ+\angle XYZ+\angle QYP=180$ (linear)

$\angle ZYQ=\angle QYP = \frac{180-}{2}$

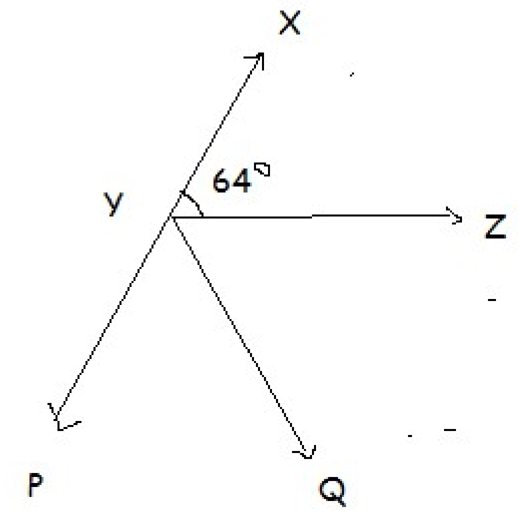
$\mathbf{\angle ZYQ=58^0}$

$\angle XYQ=64+58$

$\mathbf{\angle XYQ=122^0}$

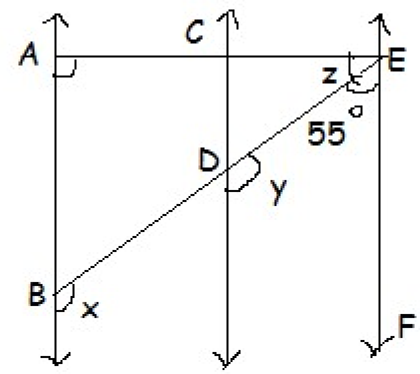
Reflex $\angle QYP=360-58$

Reflex $\angle QYP=302^0$



V.Four mark questions

63.



$y+55=180^0$ (interior angles on the same side of the transversal ED)

$\therefore y=180^0-55^0=125^0$

$\mathbf{y=125^0}$

Again $x=y$ (AB||CD corresponding angles axiom)

$\therefore \mathbf{x=125^0}$

Now since AB||CD and CD||EF

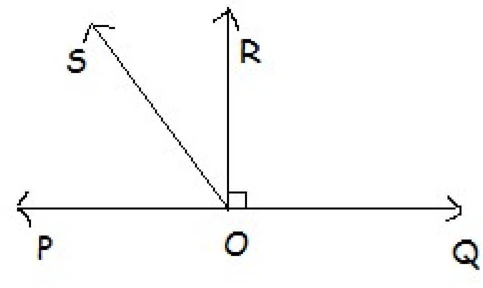
$\therefore$ AB||EF

So $\angle EAB+\angle FEA=180^0$ (Interior angles on the same side of the transversal EA)

$\therefore 90^0+Z+55^0=180^0$

Hence **$Z=35^0$**

64.



In the question, it is given that ($OR\perp PQ$) and $\angle POQ=180^0$

We can write it as $\angle ROP=\angle ROQ=90^0$

We know that

$\angle ROP=\angle ROQ$

It can be written as

$\angle POS + \angle ROS = \angle ROQ$

$\angle POS + \angle ROS = \angle QOS - \angle ROS$

$\angle ROS + \angle ROS = \angle QOS - \angle POS$

So we get

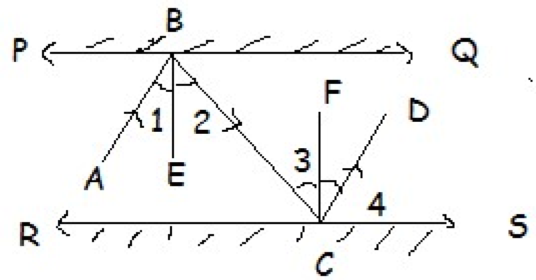
$2\angle ROS = \angle QOS - \angle POS$

(OR)

$\boldsymbol{\angle ROS = \frac{1}{2}(\angle QOS - \angle POS)}$

Hence proved

65.



Solution:

Data: In the figure

Mirror PQ||RS

To prove: AB||CD

Construction: Draw BE⊥PQ &CF⊥ RS

Proof: W.K.T Angle incidence=Angle of reflection

$\angle 1 = \angle 2$(by laws of reflection)

$\angle 3 = \angle 4$

We also know that alternate interior angles are equal

Here BE⊥CF and the transversal line BC Cuts them at Band C

So,$\angle 2 = \angle 3$(As they alternate interior angles)

Now$\angle 1 + \angle 2 = \angle 3 + \angle 4$

$\angle ABC = \angle DCB$

So**AB||CD** (Alternate interior angles are equal)

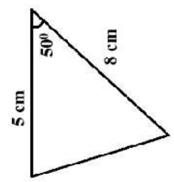
CHAPTER-7 TRIANGLES

I. Multiple choice questions

1. (C) Two circles of same radii

2. (D) $\Delta ABC \cong \Delta QRP$

3. (A)



4. (B) 60^0

5. (D) R.H.S

6. (D) $DF\ and\ MK$

7. (A) 57^0

8. (C) $BD = DE$

9. (A) 67.5^0

10. (C) 60^0

11. (B) 92^0

12. (D) 80^0

13. (C) $\Delta FOX \cong \Delta AEP$

14. (D) $GO = 5\ cm, \angle D = 40^0$

15. (A) 30^0

16. (D) AB = QP

II.One marks questions

17. Two triangles are said to be congruent if their corresponding sides and angles are equal.

18. Two circles with same radii, equilateral triangles of same sides, squares of same sides, etc.

19. Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of another triangle.

20. If in two right triangles the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the other triangle, then the two triangles are congruent.

21. If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent.

22. Two triangles are congruent if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle.

23. Corresponding vertices are $P \leftrightarrow X, Q \leftrightarrow Y$ and $R \leftrightarrow Z$.

24. Corresponding sides are $KL = GH, LM = HK$ and $KM = GK$.

25. AB = BC

III. Two marks questions

26. In the given figure PS and QR intersect at T, $\angle Q = \angle S$.

To prove: $\Delta PQT \cong \Delta RST$

Proof: In ΔPQT & ΔRST

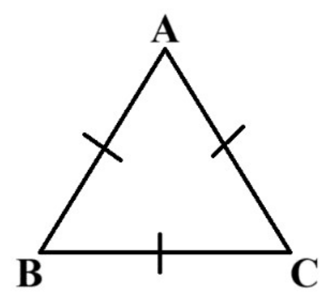
$\angle Q = \angle S$ (Given)

$\angle PTQ = \angle RTS$ (V.O.A)

$PT = TR$ (Given)

$\therefore \Delta PQT \cong \Delta RST$ (A.A.S Congruence rule)

27. ΔABC is an equilateral triangle. $AB = BC = AC$.



To prove: $\angle A = \angle B = \angle C$

Proof: In ΔABC

$AB = AC$

$\therefore \angle B = \angle C$(Opposite angles of equal sides) →→ (1)

$AB = BC$

$\therefore \angle A = \angle C$ (Opposite angles of equal sides) →→ (2)

From (1) and (2)

$\therefore \angle A = \angle B = \angle C$ (Axiom 1)

$\angle A = \angle B = \angle C = 60^0$

28. Given: In the figure, $\angle SOP = \angle SOT$, $OP = OT$, $SP = 5$ cm, $ST = ?$

In ΔSOP and ΔSOT

$OP = OT$ (Given)

$\angle SOP = \angle SOT$ (Given)

$SO = SO$ (Common side)

$\Delta SOP \cong \Delta SOT$ (S.A.S. Congruence rule)

$ST = SP$ (C.P.C.T)

$ST = 5$ cm

29. Given: CAR is a right triangle, $\angle R = 90^0$, let $\angle C : \angle A = 2 : 3$. $\angle C = ?, \angle A = ?$

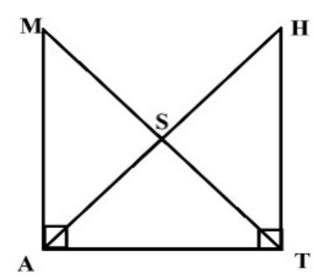
Solution: $\angle C + \angle A + \angle R = 180^0$

$\angle C + \angle A = 90^0$ ($\angle R = 90^0$)

$\angle C = \frac{2}{5} x\ 90^0 = 36^0$

$\angle A = \frac{3}{5} x\ 90^0 = 54^0$

30. In the given figure MATHS, $AH = MT$.



To Prove: AM = HT

Proof: In ΔMAT and ΔHAT

$\angle A = \angle T = 90^0$ (Given)

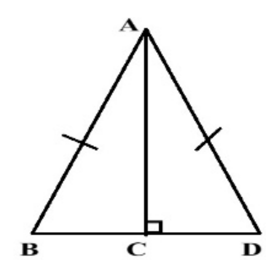
$AH = MT$ (Given)

$AT = AT$ (Common side)

$\Delta MAT \cong \Delta HTA$ (R.H.S. Congruence rule)

$AM = HT$ (C.P.C.T)

31. Given: In the $\Delta ABD, AC \perp BD$



To prove: $\angle B = \angle D$

Proof: In ΔACB and ΔACD

$\angle ACB = \angle ACD = 90^0$(Given)

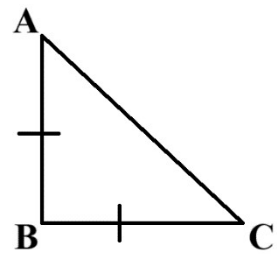
AB= AD (Given)

AC = AC (Common side)

$\triangle ACB \cong \triangle ACD$ (R.H.S. Congruence rule)

$\angle B = \angle D$ (CPCT)

32. In $\triangle ABC$, $AB = BC$, $\angle A = ?$ $\angle B = 90^0$ $\angle C = ?$



Solution: In $\triangle ABC$

$AB = BC$ (Given)

$\angle A = \angle C = x$ (Opposite angles of equal sides)

$\angle A + \angle B + \angle C = 180^0$ (Angle sum property of triangle)

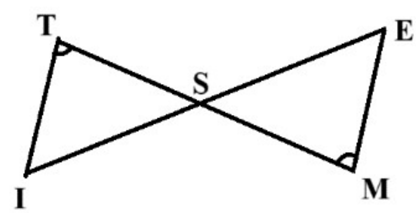
$x + 90^0 + x = 180^0$

$x = 45^0$

Therefore, each of the other to angles measure 45^0.

33. $TS = MS$ and $\angle T = \angle M$.

To Prove: $\Delta SIT \cong \Delta SEM$.



Proof: In ΔSIT and ΔSEM

$\angle T = \angle M$ (Given)

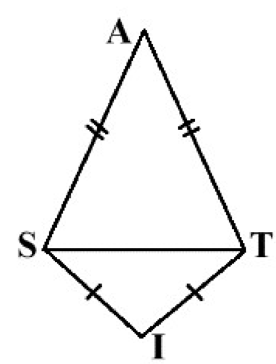
$TS = MS$ (Given)

$\angle TSI = \angle MSE$ (V.O.A)

$\therefore \Delta SIT \cong \Delta SEM$ (A.S.A. Congruence rule)

34. ΔSAT and ΔSIT are isosceles triangles are on the same base ST.

To Prove: $\angle ASI = \angle ATI$



Proof: In ΔSAT and ΔSIT

$AS = AT$ (Given)

$\angle AST = \angle ATS \rightarrow (1)$ (Opposite angles of equal sides)

$SI = TI$ (Given)

$\angle IST = \angle ITS \quad \rightarrow (2)$ (Opposite angles of equal sides)

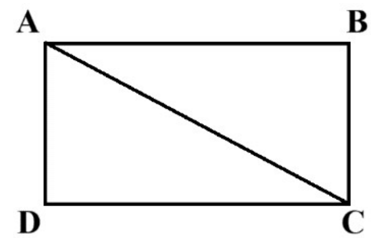
Adding (1) and (2)

$\angle AST + \angle IST = \angle ATS + \angle ITS$

$\angle ASI = \angle ATI$

IV. Three marks questions

35.Given: In rectangle ABCD, AC is the diagonal.



To Prove: $\Delta ADC \cong \Delta CBA$

Proof: In ΔADC and ΔCBA

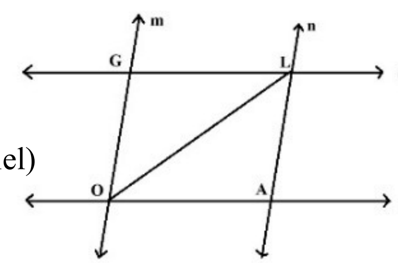
$AD = BC$ (Opposite sides of rectangle)

$DC = AB$ (Opposite sides of rectangle)

$AC = AC$ (Common sides)

$\Delta ADC \cong \Delta CBA$ (S.S.S. Congruence rule)

36. Given: In the figure, $m \parallel n \text{ and } q \parallel r$



i) GOAL is a parallelogram (two pair of opposite sides are parallel)

ΔOGL and ΔOAL

$GL = OA$ (Opposite sides of a parallelogram)

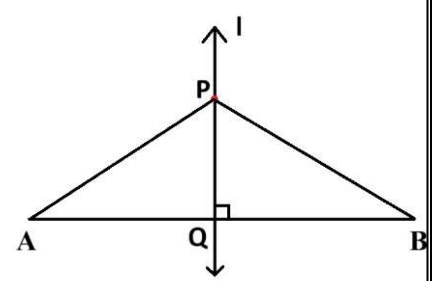
$OG = LA$ (Opposite sides of a parallelogram)

$OL = OL$ (Common side)

$\Delta OGL \cong \Delta OAL$ (S.S.S. Congruence rule)

ii) $\angle G = \angle A$ (C.P.C.T)

37. Given: In the figure, $AQ = BQ, \angle Q = 90^0$.



To prove: $AP = BP$

Proof: In ΔAQP and ΔBQP

$AQ = BQ$ (Given)

$\angle AQP = \angle BQP$ (Given)

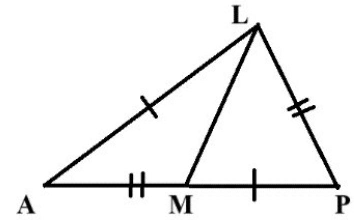
$PQ = PQ$ (Common side)

$\Delta AQP \cong \Delta BQP$ (S.A.S. Congruence rule)

$AP = BP$ (C.P.C.T)

38. Given: In the figure LAMP, $AL = MP, AM = LP$.

To Prove: $\angle ALM = \angle LMP$.

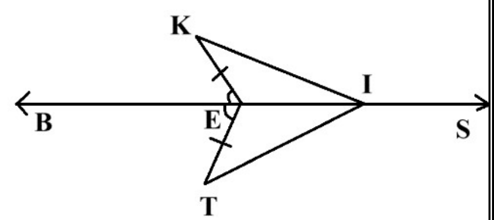


Proof: In ΔAML and ΔPML

$AL = MP$	(Given)
$AM = LP$	(Given)
$LM = LM$	(Common side)
$\Delta AML \cong \Delta PML$	(S.S.S. Congruence rule)
$\angle ALM = \angle LMP$	(C.P.C.T)

39. Given: In quadrilateral KITE, $\angle BEK = \angle BET$ and KE = ET.

To Prove: i) $\Delta KEI \cong \Delta TEI$. ii)KI = TI.



Proof: $\angle KEI = 180^0 - \angle BEK$ $\rightarrow (1)$ (L.P.A)

$\angle TEI = 180^0 - \angle BET$ (L.P.A)

$\angle TEI = 180^0 - \angle BEK$ $\rightarrow (2)$ ($\angle BEK = \angle BET$)

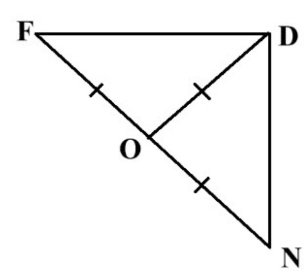
$\therefore \angle KEI = \angle TEI$ (Axiom.1)

In ΔKEI and ΔTEI

KE = ET	(Given)
$\angle KEI = \angle TEI$	(Proved)
$EI = EI$	(Common side)
$\therefore \Delta KEI \cong \Delta TEI$	(S.A.S. Congruence rule)
$\therefore$ KI = TI	(C.P.C.T)

40. Given: In ΔFND, FO = ON = OD.

To Prove: $\angle FDN = 90^0$.



Proof: In ΔFOD

FO = OD	(Given)
$\therefore \angle OFD = \angle ODF = x$	(Opposite angles of equal sides)

In ΔNOD

ON = OD (Given)

$\therefore \angle OND = \angle ODN = y$ (Opposite angles of equal sides)

$\therefore$ In ΔFDN

$\angle F + \angle D + \angle N = 180^0$ (Angle sum property of triangle)

$\angle F + \angle ODF + \angle ODN + \angle N = 180^0$

$x + x + y + y = 180^0$

$x + y = 90^0$

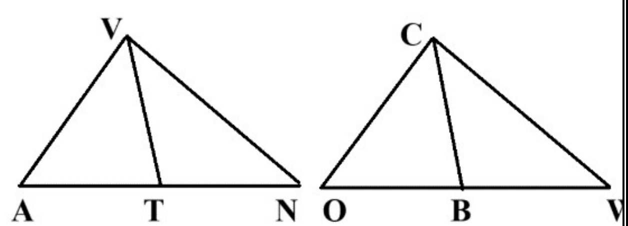
$\angle FDN = 90^0$

V. Four marks questions

41. Given: $\Delta VAN \cong \Delta COW$, $AT = TN = \frac{1}{2}AN, OB = BW = \frac{1}{2}OW$

To Prove: i) $\Delta VAT \cong \Delta COB$

ii) VT = CB



Proof: In ΔVAT and ΔCOB

$VA = CO$ ($\Delta VAT \cong \Delta COB$)

$AN = OW$ ($\Delta VAT \cong \Delta COB$)

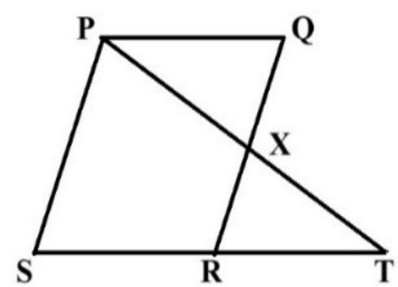
$\frac{1}{2}AN = \frac{1}{2}OW$

$AT = OB$

$VT = VT$ (Common side)

$\Delta VAT \cong \Delta COB$ (S.S.S. Congruence rule)

$VT = CB$ (C.P.C.T)



42. Given: PQRS is a parallelogram, $RX = QX$

To Prove: i) $\Delta PXQ \cong \Delta TXR$

ii) ST = 2PQ

Proof: In ΔPXQ and ΔTXR

$\angle PQX = \angle XRT$ (Alternate angles, $PQ \parallel SR$)

$QX = RX$ (Given)

$\angle PXQ = \angle RXT$ (V.O.A)

$\Delta PXQ \cong \Delta TXR$ (A.S.A. Congruence rule)

$PQ = RT$ (C.P.C.T)

$PQ = SR$ (Opposite sides of equal angles)

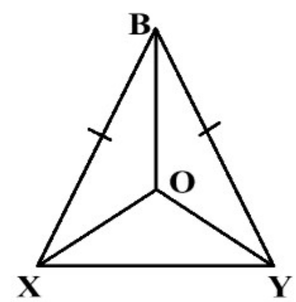
$ST = SR + RT$

$ST = PQ + PQ$

$$ST = 2PQ$$

VI. Five marks questions

43. Given: ΔBXY is an isosceles triangle, $BX = BY \angle OXY = \angle OYX$.



To Prove: i) OX = OY

ii) $\Delta BOX \cong \Delta BOY$

iii) $\angle XBO = \angle YBO$

Proof: i) $\angle OXY = \angle OYX$ (Given)

$OX = OY$ (Opposite angles of equal sides)

ii) In ΔBOX and ΔBOY

$BX = BY$ (Given)

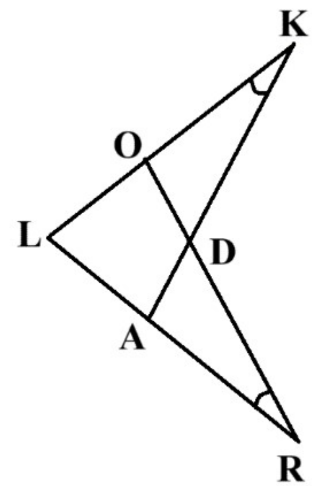
$OX = OY$ (From i)

$OB = OB$ (Common side)

$\Delta BOX \cong \Delta BOY$ (S.S.S. Congruence rule)

iii) $\angle XBO = \angle YBO$ (C.P.C.T)

44. Given: In the figure, KOLARD, $\angle AKL = \angle ORL$ and KL=RL.



To Prove:

i) $\Delta KAL \cong \Delta ROL$

ii) AK = OR

iii) AR = OK

Proof: i) In ΔAKL and ΔORL

$\angle AKL = \angle ORL$ (Given)

$KL = RL$ (Given)

$\angle KLR = \angle KLR$ (Common side)

$\Delta KAL \cong \Delta ROL$ (A.S.A. Congruence rule)

ii) $AK = OR$ (C.P.C.T)

iii) $KL = LR$ (C.P.C.T)

$LO = AL$ (C.P.C.T)

$KL - LO = LR - AL$

$OK = AR$

CHAPTER 8 – QUADRILATERALS

I.Multiple choice questions

1. (C) DB
2. (D) 360^0
3. (A) ∠R
4. (B) Rectangle
5. (D) 180^o
6. (B) 18cm
7. (D) Rhombus
8. (C) ∠EDF = ∠DFG
9. (A) Rectangle
10. (D) Diagonals are unequal and do not bisect each other.
11. (B) OQ = OS
12. (D) 110^0
13. (B) 8cm
14. (B) 72^0
15. (B) 40^0
16. (C) 112^0
17. (D) 90^0
18. (C) 30^0
19. (C) Rectangle
20. (B) 45^0
21. (D) 72^0 and 108^0
22. (A) 25^0
23. (C) 50^0
24. (D) 90^0
25. (D) 40cm
26. (D) ∠HOG $=90^0$ and OE = OG
27. (C) 180^0
28. (A) 15cm
29. (B) 50^0
30. (B) 180^0

31. (D) DE = $\frac{1}{2}$BC

32. (B) BC = 2PQ

33. (D) Parallelogram

34. (B) 5cm

35. (C) 48cm

II.One marks questions

36. (i) Opposite sides are equal and parallel.

(ii) Diagonals bisect each other.

37. (i) All the sides are equal.

(ii) Diagonals bisect each other perpendicularly,

38. The line segment joining the midpoints of two sides of a triangle is parallel to the third side.

39. Given, $\angle BAC = 45^0$

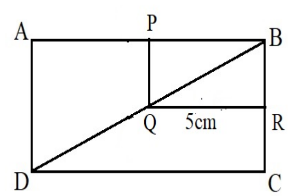
$\therefore \angle DCA = 45^0$ [Alternate angles]

40. 60^0 and 120^0

41. $\angle AEF = 125^0$

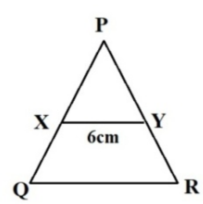
42. QR = PB = 5cm

AB = AP + PB = 5 + 5 = **10cm**



43. Given XY = 6cm

QR = 2XY = 2(6) = **12cm**

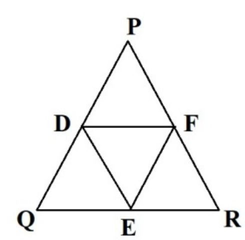


44. Given Perimeter of the ΔPQR = 36cm,

The perimeter of the ΔDEF = $\frac{1}{2}$ (Perimeter of the ΔPQR)

$= \frac{1}{2} \times 36$

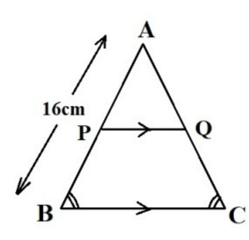
= 18cm



45. In ΔABC, AB = 16cm

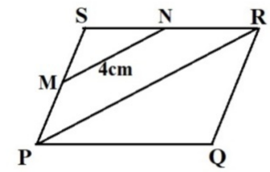
AC = 16cm.

AQ = AP = 8cm



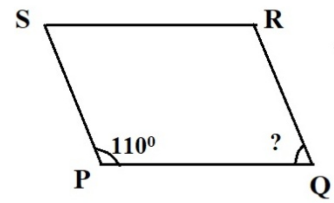
46. MN = 4cm

PR = 2MN = 2(4) = 8cm



III.Two marks questions

47. Given $\angle P = 110^0$, $\angle Q$ =?



PQRS is a parallelogram.

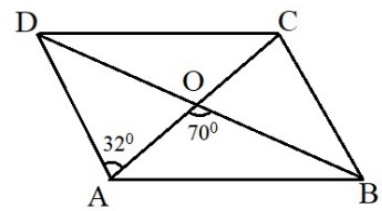
$\angle P + \angle Q = 180^0$

$110^0 + \angle Q = 180^0$

$\angle Q = 180^0 - 110^0$

$\angle Q = 70^0$

48. Given $\angle DAC = 32^o$ and $\angle AOB = 70^o$, $\angle DBC$ =?



$\angle BOC = 180^0 - 70^0 = 110^0$

$\angle OCB = \angle DAC = 32^0$ (alternate angles)

In ΔBOC,

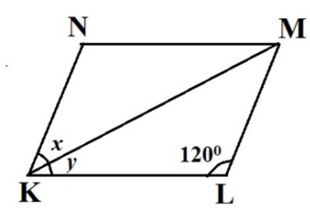
$\angle OCB + \angle BOC + \angle OBC = 180^0$

$32^0 + 110^0 + \angle OBC = 180^0$

$\angle OBC = 38^0$

$\angle DBC = \angle OBC = 38^0$

49. In the figure, KLMN is a parallelogram.



KM is a diagonal which bisects $\angle K$.

$\therefore$ x = y

$\angle K + \angle L = 180^0$

$x + y + 120^0 = 180^0$

$x + x = 180^0 - 120^0$

$2x = 60^0$

$\therefore x = 30.$

$\therefore x = y = 30^0$

50. Let one angle of a parallelogram be *'x'*.

The other angle will be $\frac{2}{3} \times x$

Sum of consecutive angles is = 180^0

$x + \frac{2}{3}x = 180^0$

$\frac{3x+2x}{3} = 180^0$

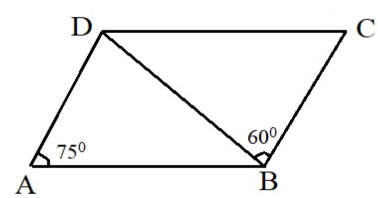
$\frac{5}{3}x = 180^0$

$x = \frac{3}{5} \times 180^0$

$\boldsymbol{x = 108^0}$

$\therefore$ other angle is $= \frac{2}{3} \times x = \frac{2}{3} \times 108^0 = \mathbf{72^0}$

51. Given $\angle DAB = 75^o$ and $\angle DBC = 60^o$, $\angle CDB =$? and $\angle ADB =$?



$\angle ADB = \angle DBC$ (Alternate angles)

$\mathbf{\therefore \angle ADB = 60^0}$

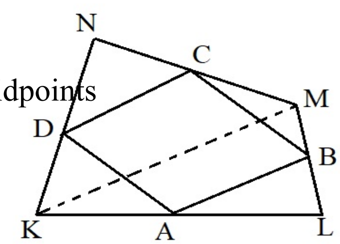
$\angle ADB + \angle DAB + \angle ABD = 180^0$

$60^0 + 75^0 + \angle ABD = 180^0$

$\angle ABD = 45^0$

$\mathbf{\therefore \angle CDB = \angle ABD = 45^0}$ (Alternate angles)

IV. Three marks questions



52. **Data:** KLMN is a quadrilateral. A, B, C and D are the midpoints of KL, LM, MN and NK respectively.

To Prove: ABCD is a parallelogram.

Proof: In $\triangle KLM$,

$AB \parallel KM$ and $AB = \frac{1}{2} KM$ (by Mid point theorem) ----(1)

In ΔKMN,

$DC \parallel KM$ and $DC = \frac{1}{2} KM$ (by Mid point theorem) ----(2)

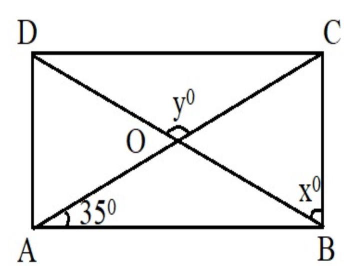
From (1) and (2)

$AB \parallel DC$ and $AB = DC$

A pair of opposite sides are equal and parallel.

∴ ABCD is a parallelogram.

53. ABCD is a rectangle.



In $\triangle AOB$, OA = OB (diagonals are equal and bisect each other)

$\therefore \angle OAB = \angle OBA = 35^0$ (angles opposite to equal sides are equal.)

$\angle ABC = 90^0$

$\angle OBA + \angle OBC = 90^0$

$35^0 + x = 90^0$

$x = 90^0 - 35^0$

$\mathbf{x = 55^0}$

In ΔAOB,

$\angle AOB + \angle OAB + \angle OBA = 180^0$

$\angle AOB + 35^0 + 35^0 = 180^0$

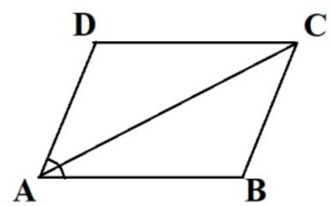
$\angle AOB = 180^0 - 70^0$

$\angle AOB = 110^0$

$y = \angle AOB$ (vertically opposite angles)

$\mathbf{y = 110^0}$

54. Given Diagonal AC of a parallelogram ABCD bisects $\angle A$



i)In ΔADC and ΔABC

AD = BC (Opposite sides)

DC = BA (Opposite sides)

AC = AC (Common side)

$\Delta ADC \cong \Delta ABC$ (SSS congruency)

$\angle ACD = \angle BCA$ (CPCT)

Diagonal AC bisects $\angle C$.

ii) $\angle ACD = \angle CAD$

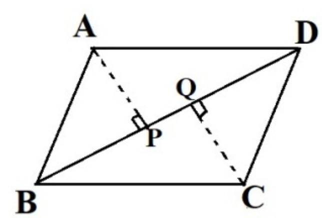
AD = CD (sides opposite to equal angles are equal)

But, DA = BC and AB = CD

$\therefore$ AB = BC = CD = DA

$\therefore$ ABCD is a rhombus.

55. Given ABCD is a parallelogram.



In ΔAPB and ΔCQD

AB = CD (opposite sides)

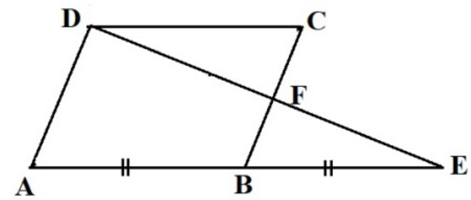
$\angle APB = \angle CQD = 90^0$ (given)

$\angle ABP = \angle CDQ$ (alternate angles)

$\Delta APB \cong \Delta CQD$ (ASA congruency)

And also, AP = CQ (CPCT)

56. Given ABCD is a parallelogram and AB = BE.



In ΔFDC and ΔFEB

DC = BE (Given and DC = AB)

∠DCF = ∠EBF (Alternate angles)

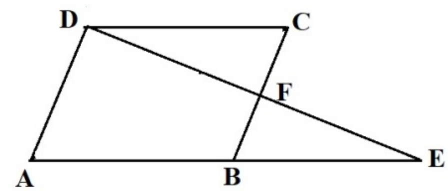
∠CFD =∠BFE (V.O.A)

ΔFDC ≅ ΔFEB (AAS Congruency)

∴ CF = FB (CPCT)

∴ED bisects BC.

57. Given, ABCD is a parallelogram. ‘F’ is the midpoint of side BC.



In ΔFDC and ΔFEB

∠DCF = ∠EBF (Alternate angles)

∠CFD =∠BFE (V.O.A)

CF = FB (Given)

ΔFDC ≅ ΔFEB (ASA Congruency)

∴ DC = BE (CPCT)

But DC = AB

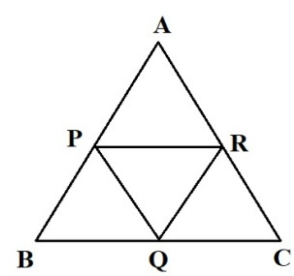
∴DC = AB = BE

∴AE = AB + BE = AB + AB

⇒AE = 2AB

58. Given, ABC is an equilateral triangle.

∴AB = BC = AC.



Since P and Q are the midpoints of AB and BC

PQ = $\frac{1}{2}$ AC (by Midpoint theorem)

Similarly, PR= $\frac{1}{2}$ BC and QR = $\frac{1}{2}$ AB

Given AB = BC = AC

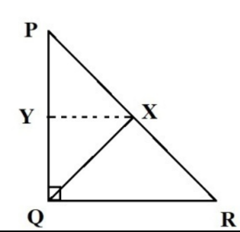
$\frac{1}{2}$ AB = $\frac{1}{2}$ BC = $\frac{1}{2}$ AC

⇒ QR = PR = PQ

∴ΔPQR is also an equilateral triangle.

59. **Data:** ΔPQR is a right angled at ‘Q’and ‘X’ is the midpoint of PR.

To Prove: XP = XQ = XR.



Construction: Through X draw XY ∥ RQ

Proof: In the figure,

$\angle PYX = \angle PQR = 90^0$ (corresponding angles)

$\therefore \angle QYX = \angle PYX = 90^0$

In ΔPQR, X is the midpoint of PR and

XY ∥ RQ (By construction)

∴ Y is the midpoint of PQ. (converse of midpoint theorem)

∴ PY = QY

In ΔPYX and ΔQYX

PY = QY (proved)

XY = XY (common side)

∠QYX = ∠PYX (each equal to 90^0)

ΔPYX ≅ΔQYX (SAS postulate)

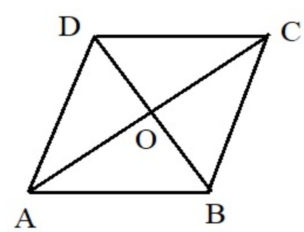
∴ XP = XQ (CPCT)

But XP = XR (X is midpoint of PR)

∴ **XP = XQ = XR.**

V.Four marks questions

60. **Data:** ABCD is a parallelogram. AC and BD are the diagonals which Intersect at 'O'



To Prove: OA = OC and OB = OD

Proof: In ΔAOB and ΔCOD

AB = DC (opp. sides of a parallelogram)

∠ABO = ∠CDO (Alternate angles)

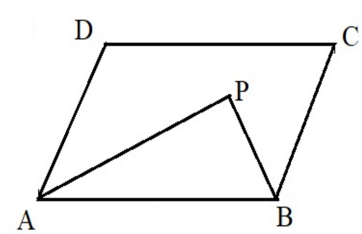
∠BAO = ∠OCD (Alternate angles)

△AOB ≅△COD (SAS Postulate)

OA = OC and OB = OD (CPCT)

Hence Diagonals of a parallelogram bisect each other.

61. **Data:** ABCD is a parallelogram. AP and BP are angular bisectors of ∠A and ∠B respectively.



To Prove: $\angle APB = 90^0$

Proof: In a parallelogram

$\angle A + \angle B = 180^0$

$2(\angle PAB) + 2(\angle PBA) = 180^0$

$\angle PAB + \angle PBA = \frac{180}{2} = 90^0$ ---(1)

In ΔAPB, $\angle PAB + \angle PBA + \angle APB = 180^0$

$90^0 + \angle APB = 180^0$

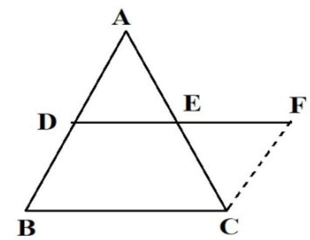
$\angle APB = 180^0 - 90^0 = \mathbf{90^0}$

$\therefore$Bisectors of any two consecutive angles of a parallelogram intersect at right angles.

VII. Five marks questions

62. **Data:** In $\triangle ABC$, D and E are the midpoints of AB and AC respectively.

DE is joined



To Prove: DE ∥ BC.

Construction: Draw CF ∥ BA and produce DE to meet this at F.

Proof: In $\triangle AED$ and $\triangle CEF$

$\angle AED = \angle CEF$	(V.O.A)
AE = CE	(E is midpoint of AC)
$\angle DAE = \angle FCE$	(Alternate angles)
$\triangle AED \cong \triangle CEF$	(ASA Criterion)
$\therefore$ AD = CF and DE = EF	(CPCT)
But AD = BD	(D is midpoint of AB)
And BD∥ CF	(C0nstruction)

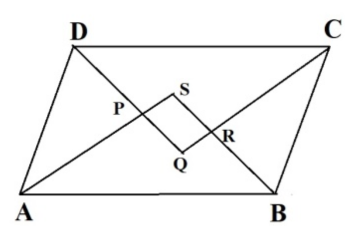
$\therefore$ BD = CF and BD∥ CF

⇒BCFD is a parallelogram.

DF ∥BC and DF = BC

⇒DE ∥ BC

63. ABCD is a parallelogram.



DC ∥ AB

$\angle A + \angle D = 180^0$

$\frac{1}{2}\angle A + \frac{1}{2}\angle D = 90^0$

$\Rightarrow \angle PAD + \angle PDA = 90^0$

$\Rightarrow \angle APD = 90^0$ (sum of three angles of a $\triangle$ is 180^0)

$\Rightarrow \angle SPQ = 90^0$ (V.O.A)

Now, AD ∥ BC

$\angle D + \angle C = 180^0$

$\frac{1}{2}\angle D + \frac{1}{2}\angle C = 90^0$

$\Rightarrow \angle QDC + \angle QCD = 90^0$

$\Rightarrow \angle DQC = 90^0$ (sum of three angles of a $\triangle$ is 180^0)

$\Rightarrow \angle PQR = 90^0$ (V.O.A)

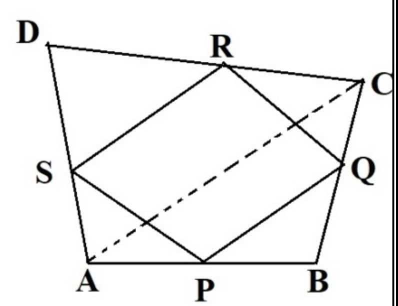
Similarly, $\angle QRS = 90^0$ and $\angle RSP = 90^0$.

Thus, PQRS is a quadrilateral and each of those angles is 90^0.

Hence, PQRS is a Rectangle.

∴ **The bisectors of the angles of a parallelogram form a rectangle**.

64. **Data:** ABCD is a quadrilateral. P, Q, R and S are the midpoints of AB, BC, CD and DA respectively.



To Prove: PQRS is a parallelogram.

Proof: In $\triangle ADC$,

SR ∥ AC and SR = $\frac{1}{2}$ AC(by Mid point theorem) ----(1)

In ABC,

PQ ∥AC and PQ = $\frac{1}{2}$ AC (by Mid point theorem) ----(2)

From (1) and (2)

SR ∥ PQ and SR = PQ

A pair of opposite sides are equal and parallel.

∴ PQRS is a parallelogram.

CHAPTER-9 CIRCLES

I. Multiple choice questions

1. C) 6cm
2. B) 3cm
3. A) 40^0
4. C) 12cm
5. D) 8cm
6. A) 2cm
7. C) 10cm
8. D) 45^0
9. A) 50^0
10. C) 70^0
11. C) 60^0
12. B) 10cm
13. A) a = ½ ab
14. D) 8cm
15. D) 130^0
16. A) 2cm
17. A) 35^0
18. B) X<Y
19. D) 80^0
20. B) 50^0
21. B) 40^0

II. Onemarks questions

22. 40^0
23. 180^0
24. 8cm
25. OA is perpendicular to PQ

26.70^0

27. $\angle A + \angle B + \angle C = 180^0$

$68^0 + 90^0 + \angle C = 180$, $\angle C = 180 - 158 = 22^0$

28. $\angle AOC = 90^0$

29. Angles subtended in the same segment of a circle are equal.

30. If all the four vertices of a quadrilateral lie on the circle then it is called cyclic quadrilateral.

III. Two marks questions

31. $2x + 3 = 4x - 3$

$2x - 4x = -3 - 3$, $-2x = -6$, $x = 3$

32. $OC \perp AB$

Therefore $AC = BC = \frac{1}{2} AB$, $OC^2 = OB^2 - CB^2 = 12^2 - 5^2 = 119$, $OC = \sqrt{119}$.

33. $OD \perp AB$ therefore "D" is the mid point of AB

In ΔABC, O & D are midpoints of BC & AB respectively.

Therefore $OD \parallel AC$ & $OD = \frac{1}{2} AC$ (by midpoint theorem)

Therefore $CA = 2\ OD$.

34. ΔABC is an equilateral triangle.

$\angle BAC = 60^0$, $\angle BDC + \angle BAC = 180^0$

$\angle BDC = 180^0 - 60^0 = 120^0$.

35. Join AB and BC, reflex $\angle AOC = 360^0 - (60^0 + 30^0) = 270^0$

Hence $\angle ABC = \frac{270^0}{2} = 135^0$ (angle at the circumference will be half of the angle at the centre)

36. $\angle BAC = \angle BDC$ so, $\angle ABC + \angle BAC + \angle ACB = 180^0$

$\angle BAC = 180^0 - 69^0 - 31^0 = 80^0$.

37. "O" is the centre of the circle therefore $\angle BAC = \frac{1}{2} \angle BOC = \frac{1}{2} \times 100 = 50^0$

$\angle X = 180^0 - \angle BAC = 180^0 - 50^0 = 130^0$.

38. Join AB, $\angle$ ABD = 90^0(angle in a semicircle)

$\angle$ABC = 90^0(angle in the semicircle)

so, $\angle$ ABD + $\angle$ ABC = $90^0 + 90^0 = 180^0$

therefore, DBC is a line.

39. OA = OB, CD = EF (given)

Arc DC = Arc EF

(Corresponding arcs of the equal chords are congruent)

= Arc EC + Arc DE = Arc DE + Arc FD

= Arc EC = Arc FD hence proved.

40. If OE = OF implies CD = AB(chords equidistant from the centre are equal)

But OE < OF (given)

CD > AB (chords nearer to the centre is longer)

41. In cyclic quadrilateral $\angle$ABC + $\angle$AEC = 180^0, $\angle$ABC + $110^0 = 180^0$

$\angle$ABC = $\angle$ADC = 70^0.

IV. Three marks questions

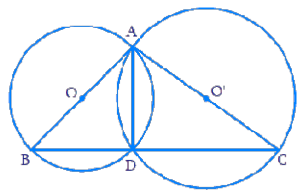
42. Reflex $\angle$AOC = 2 X $\angle$ADC, 2 X $130^0 = 260^0$

$\angle$AOC = 100^0, $\angle$COB = $180^0 - 100^0 = 80^0$

$\angle$CEB = ½ $\angle$COB = 40^0, $\angle$CEB = $\angle$ECB = 40^0

$\angle$CBE = $180^0 - (40^0 + 40^0) = 100^0$

43. We know that an angle in a semicircle is a right angle. By using this fact, we can show that BDC is a line that will lead to proving that the point of intersection lies on the third side.



Since angle in a semicircle is a right angle, we get:

$\angle ADB = 90°$ and $\angle ADC = 90°$

$\angle ADB + \angle ADC = 90° + 90°$

$\Rightarrow \angle ADB + \angle ADC = 180°$

⇒ BDC is a straight line.

D lies on BC

Hence, the point of intersection of circles lies on the third side BC.

44. $\angle BAC = \frac{1}{2} Y$, $50^0 = \frac{1}{2} Y$, $Y = 100^0$

$\angle X + \angle Y = 360^0$(angle at the centre of a circle)

$\angle X + 100^0 = 360^0$, $\angle X = 360^0 - 100^0 = 260^0$.

45. $AM = MB = \frac{1}{2}AB = \frac{1}{2}(30) = 15$ cm

In triangle OMA

Using Pythagoras theorem

$OA^2 = OM^2 + AM^2$

Substituting the values

$17^2 = OM^2 + 15^2$

By further calculation

$OM^2 = 289 - 225 = 64$

So we getOM = 8 cm

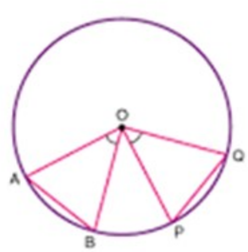
46. **Given:** Two chords AB and CD of a circle with centre O, where ∠AOB = ∠COD.

To prove: AB = CD

Construction: Join OA, OB, OC, and OD (radii of the circle).

Proof:

- In triangles AOB and COD:
  - OA = OD (radii of the same circle)
  - ∠AOB = ∠COD (given)
  - OB = OC (radii of the same circle)
- Therefore, by the SAS congruence postulate, ΔAOB ≅ ΔCOD.
- Since the triangles are congruent, their corresponding parts are equal.
- Thus, AB = CD (corresponding sides of congruent triangles).

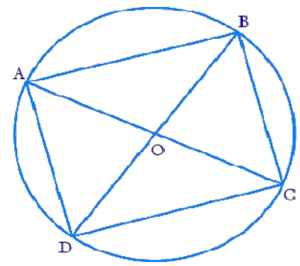


Therefore, if the angles subtended by two chords at the are equal then the chords are equal.

V. Four marks questions

47. Let BD be the diameter of the circle, which is also a chord.

Then, ∠BOD = 180°



Since AC and BD are diameters of the circle

⇒ AC = BD

We know that the angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.

∴∠BAD = $\frac{1}{2}$× ∠BOD = 90°

Similarly, ∠BCD = 90°

Now, considering AC as the diameter of the circle, we get ∠AOC = 180°

We know that the angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.

∠ABC = $\frac{1}{2}$ × ∠AOC = 90°

Similarly, ∠ADC = 90°

Let us now consider the triangles ΔABC and ΔBAD,

∠ABC = ∠BAD [Each equal to 90°]

AB = BA [Common side of triangle ABC and BAD]

AC = BD [Diameter of the circle]

∴ ΔABC ≅ ΔBAD [By RHS congruence criteria]

⇒ BC = AD [By Corresponding parts of Congruent triangles theorem]

Similarly, AB = DC

As you can see, all the angles at the corners are 90º and the opposite sides are equal. We can say that the shape joining the vertices ABCD is a rectangle.

48. In ΔDOQ & Δ AOP

OD = OA (radii of same circle)

⌊ DOQ = ⌊ AOP (vertically opposite angles)

⌊ QDO = ⌊ PAO (alternate angle CD ∥ AB)

Δ DOQ congruent to ΔAOP

OQ = OP (by CPCT)

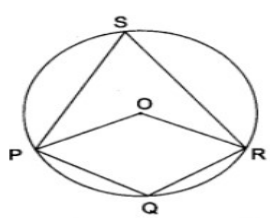
CD = AB

(chords equidistant from the centre of a circle are equal).

VI. Four marks questions

49.

.



$$\Rightarrow \quad \angle PSR = \frac{1}{2}\angle POR \quad ...(1)$$

and Reflex $\angle POR = 2\angle PQR$

$$\Rightarrow \quad \angle PQR = \frac{1}{2} \text{ Reflex } \angle POR \quad ...(2)$$

Adding Equation (1) and (2)

$$\angle PSR + \angle PQR = \frac{1}{2}\angle POR + \frac{1}{2} \text{ Reflex } \angle POR$$

$$= \frac{1}{2}[\angle POR + \text{Reflex } \angle POR]$$

$$= \frac{1}{2} \times 360° = 180°$$

$$\Rightarrow \quad \angle S + \angle Q = 180°$$

50. Let AB & AC be two equal chords.

AB = AC = 6cm, BC = $x + x = 2x$

AD perpendicular to BC,therefore BD = DC

AD is the perpendicular bisector & centre O lies on AD. Join OB & CD

Now BD = DC = x& OD = y

In ΔOBD, $\angle D = 90^0$ therefore $OB^2 = BD^2 + OD^2$

$25 = x^2 + y^2$ _________(1), $x^2 = 25 - y^2$

Again in ΔABD, $\angle D = 90^0$ so $AB^2 = BD^2 + AD^2$

$36 = x^2 + (5 - y)^2$ ______(2) substitute the value of x^2 in (2)

$36 = 25 - y^2 + 25 - 10y + y^2, y = \frac{7}{5}$

Put the value of y in (1)

$25 = x^2 + (\frac{7}{5})^2 x = 4.8$cm

BC = 2times $x = 2 \times 4.8 = 9.6$cm

CHAPTER-10 HERON'S FORMULA

I. Multiple choice questions

1. B) $\frac{a+b+c}{2}$
2. B) 11.5
3. C) 13cm
4. A) 6sqcm
5. A) √32cm
6. B) $\frac{\sqrt{3}}{4}$ a^2
7. B) 4800 cm^2
8. C) 30 cm^2

II. One marks questions

9. Area = $\sqrt{s\ (s - a)\ (s - b)\ (s - c)}$

10. S = $\frac{18+10+14}{2}$= 21cm

11. Each side is equal therefore perimeter = 3x =180, x = 60cm

12. Sum of sides = 1x + 3x + 2x = 6x, perimeter = 30, x = $\frac{30}{6}$= 5cm

13. (s – a) = 235 – 150 = 85cm

    (s – b) = 235– 120 = 115

    (s–c) = 235 – 200 = 35cm

    (s – a) (s – b) (s – c) =342125cm

14. Heron's formula deals with sides of triangles irrespective of type of triangles.

III. Two marks questions

15. a = 122m, b = 22m, c = 120m,s = 132m

Area = $\sqrt{s(\ s - \ a\ )(\ s - b\ )\ (\ s - c)}$

= $\sqrt{132\ (\ 132 - \ 122)\ (\ 132 - \ 22)\ (132 - \ 120)}$ = 1320sqcm

16. Let the sides of the triangle be 12x, 17x, 25x

12x + 17x + 25x = 540, 54x = 540, x = $\frac{540}{54}$= 10cm

a = 12x = 12 x 10 = 120cm   b = 17x = 17 x 10 = 170cm   c = 25x = 25 x 10 = 250cm

17. AB = BC = 3X & AC = 2X

PERIMETER = 3X + 3X + 2X = 32, X = $\frac{32}{8}$ = 4cm, s = $\frac{a+b+c}{2}$= $\frac{12+1}{2}$= 16

Area = $\sqrt{s(s-a)(s-b)(s-c)}$

= $\sqrt{16\ (16-12)\ (16-12)\ (16-8)}$ = 45.25cm^2

18. In equilateral triangle each side is equal a = b = c = x cm, s = $\frac{a+b+c}{2}$ = $\frac{x+x+x}{2}$= $\frac{3x}{2}$.

A = $\sqrt{s(s-a)(s-b)(s-c)}$

= $\sqrt{\frac{3x}{2}(\frac{3x}{2}-x)(\frac{3x}{2}-x)(\frac{3x}{2}-x)}$

= $\frac{\sqrt{3}}{4}x^2$ cm^2

IV. Three marks questions

19. a = 26m, b = 28 m, c = 30m

A = $\sqrt{s(s-a)(s-b)(s-c)}$= $\sqrt{42\ (42-26)\ (42-28)\ (42-30)}$ = 336m^2.

20. sides of park a = 120m, b = 80 m, c = 50ms = $\frac{120+80+5}{2}$= 125m

Area = $\sqrt{s(s-a)(s-b)(s-c)}$= $\sqrt{125\ (125-120)\ (125-80)\ (125-50)}$

= 375 $\sqrt{15}$ m^2

21. a = 35cm, b = 54 cm, c = 61 cm, s = $\frac{35+54+61}{2}$= 75 cm

A = $\sqrt{s(s-a)(s-b)(s-c)}$ = $\sqrt{75\ (75-35)\ (75-54)\ (75-61)}$ = 420$\sqrt{5}$cm^2.

Area of triangle = ½ x a x h = 420$\sqrt{5}$ = ½ x 35 x h , h = $\frac{420\sqrt{5}\text{x } 2}{35}$= 24$\sqrt{5}$ cm

V. Four marks questions:

22. let a, b, c be the sides of the triangle. S_1 = s = $\frac{a+b+c}{2}$, A_1= $\sqrt{S1(S1-a)\ (S1-b)\ (S1-c)}$

When the sides are doubled 2a, 2b, 2c, s_2= $2s_1$

$A_2 = \sqrt{S2\ (S2 - 2a)\ (S2 - 2b)\ (S2 - 2c)}$

Substitute $S_2 = 2S_1$ in above equation

$A_2 = \sqrt{2\ S1(\ 2S\ 1 - 2a\ )\ (\ 2S1 - 2b)\ (2S1 - 2C)} = 4\sqrt{S1(S\ 1 - a)\ (S1 - b)\ (S1 - c)}$

$= A_2 = 4\ A_1 = 4$ x Area of original triangle

Hence percentage increase in area $= \frac{increase\ in\ area}{original\ area}$ x 100 $= \frac{A2 - A1}{A1}$ x 100

$= (A_2/\ A_1 - 1)$ x 100 = (4 – 1) x 100 = 300%

23. let ABCD be rhombus AB = BC = CD = DA = X

P = 40cm, 4x = 40, x = 10cm, AB = BC = CD = DA = 10cm

In triangle ABCS $= \frac{10+10+12}{2} = 16$ cm

$A = \sqrt{s(\ s - a\ )(\ s - b\ )\ (\ s - c)} = \sqrt{16\ (16 - 10)\ (16 - 10)\ (16 - 10)}$

= 48 cm^2.

Area of ABCD = 2 x 48 = 96 cm^2.

Cost of painting the sheet = 5 x 96 x 2 = Rs 960.

VI. Five marks question

24. AC = BD = 44cm, AO = BO $= \frac{44}{2} = 22$cm

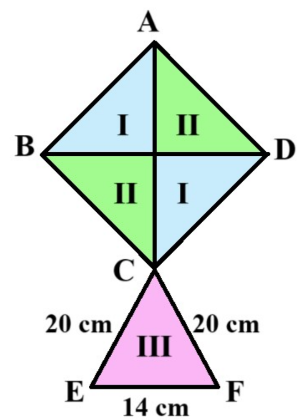
In ΔAOB, $AB^2 = AO^2 + BO^2 = 22^2 + 22^2 = 22\sqrt{2}$ cm, area of square $= (a)^2 = (22\sqrt{2})^2 =$ 968cm^2.

Area of each triangle = area of square /4 = 968 / 4 = 242sqcm.

Area of region I = 2 X 242 = 484sqcm

Area of region II = 2 X 242 = 484sqcm

Area of lower triangle a = 20, b = 20, c = 14, s $= \frac{20 + 20 + 14}{2} = 27$



$A = \sqrt{s(\ s - a\ )(\ s - b\ )\ (\ s - c)}$

$= \sqrt{27\ (27 - 20)\ (27 - 20)\ (27 - 14)}$

= 131.14cm^2.

CHAPTER-11 SURFACE AREAS AND VOLUME

I. Multiple choice questions

1. (A) π rl sq. units

2. (B) $y^2 = x^2 - z^2$

3. (B) 308 cm^2

4.(D) 20 cm

5. (D) 616cm^2

6. (A) 7 cm

7. (B) 26 m

8. (B) 5500 cm^2

9.(B) 5 : 4

10. (B) πr(r+l)

11. (D) 4 **π** r^2

12. (C) 616cm^2

13. (C) 10.5 cm

14. (C) 4 times

15. (B) 2:1

16. (C) 3 **π** r^2

17. (B) 4 **π** r^2

18. (B) 4S

19. (B) 4:9

20. (C) 10.5 cm

21. (C) 1:4

22. (B) 2.476

23. (D) 13 cm

24. (D) 33.1%

25. (A) 9m

26. (D) $\frac{32}{3}\pi r^3$

27. (A) $\frac{250}{3}\pi r^3$

28. (C) 462 cm^2

29. (A) 1:4

30. (B) 3 Units

31. (B) 3 cm

II. One marks questions

32. $A= \pi r(r+l)$ sq. units

33. $l=\sqrt{h^2 - r^2} =\sqrt{28^2 - 21^2}= 35cm$

34. $A= \pi rl = \frac{22}{7} \times 10 \times 21 = 660\ cm^2$

35. $A=2\pi r^2$

36. $A=3\pi r^2$

37. $A=2\pi r^2$

$= 2 \times \frac{22}{7} \times 21 \times 21 = 2772\ cm^2$

38. $A=4\pi r^2$

$= 4 \times \frac{22}{7} \times 7 \times 7 = 616\ cm^2$

39. $d=14\ cm \Rightarrow r=7\ cm$

$A=3\pi r^2$

$=3 \times \frac{22}{7} \times 7 \times 7 = 462\ cm^2$

40. $2\pi r= 22cm \Rightarrow \pi r= 11cm,\ l= 10cm$

$A= \pi rl =11\ (10) =110\ cm^2$

41. $V= \frac{4}{3}\pi r^3$

42. Volume of sphere = Surface area of sphere

$\frac{4}{3}\pi r^3 = 4\pi r^2$

r = 3 units

43. $\frac{Volume\ of\ sphere}{Volume\ of\ hemisphere} = \frac{\frac{4}{3}\pi r^3}{\frac{2}{3}\pi r^3} = \frac{2}{1} = 2 : 1$

44. h=$\sqrt{l^2 - r^2}$ =$\sqrt{5^2 - 4^2}$= 3cm

45. surface area of a sphere =100π cm^2

$4\pi r^2 = 100\pi$

r = 5cm

III. Two marks questions

46. l=$\sqrt{h^2 + r^2}$ = l=$\sqrt{28^2 + 21^2}$ = 35cm

A = πrl = $\frac{22}{7}$ x 21 x 35= 2310 cm^2

47. 2πr =$\frac{44}{7}$, r= 1m

l=$\sqrt{h^2 + r^2}$ =$\sqrt{1^2 + 8^2}$ =$\sqrt{65}$ m

The area of the canvas required = πrl = πx1x$\sqrt{65}$ = $\sqrt{65}$ π m^2

48. d=10.5cm ⇒ r= 5.25cm

A = πrl = $\frac{22}{7}$ x 5.25 x 10= 165 cm^2

49. r=24m, l = 21m.

A=πr (r+l) = $\frac{22}{7}$ 24(24+21) = 3394.28 m^2

50. d=14cm⇒ r= 7cm

A= 4π r^2 = 4x$\frac{22}{7}$ x7x7 = 616 cm^3

51. Given: CSA = 550 cm^2, l = 25cm.

CSA = πrl ⇒550 = $\frac{22}{7}$ x r x 25 ⇒ r = 7cm

The radius of the base of the cone is 7cm

52. Given Area of the base, π r^2 = 154m^2 and Volume = 1232 m^3

Volume of the conical tent = 1232 m^3

$\frac{1}{3}\pi r^2 h = 1232$

$\frac{1}{3}$ (154) h = 1232

h = 24m

The height of the conical tent is 24m

53. Given r = 7m, h = 24m

l = $\sqrt{h^2 + r^2}$= $\sqrt{24^2 + 7^2}$ = 25m

CSA = πrl = $\frac{22}{7}$ x 7 x 25 = 550 m^2

Area of the cloth = length x breadth

550 = length x 5

Length = 110 m

110m of cloth is required to make the tent.

54. V= $\frac{1}{3}\pi r^2$ h = $\frac{1}{3}$ x $\frac{22}{7}$ x 6^2 x 7 = 264 cm^3

55. Given ratio of the volumes of two cones is 4: 5 ⇒ v_1: v_2 = 4: 5 or $\frac{v_1}{v_2} = \frac{4}{5}$

ratio of the radii of their bases is 2: 3 ⇒ r_1 : r_2 = 2 : 3 or $\frac{r_1}{r_2} = \frac{2}{3}$

ratio of vertical heights h_1 : h_2 =?

$\frac{v_1}{v_2} = \frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} \Rightarrow \frac{4}{5} = \frac{2^2 h_1}{3^2 h_2} \Rightarrow \frac{h_1}{h_2} = \frac{9}{5}$

The ratio of their vertical heights is 9 : 5

56. Given Circumference of the base = 17.6cm

2 **π** r = 17.6 ⇒ r = 2.8 cm

CSA = 2 **π** r^2 = 2 x$\frac{22}{7}$x$(2.8)^2$

CSA = 49.28cm^2

57. Given, surface area of a metallic ball = 154 cm^2

4 **π** r^2 = 154

$r^2 = \frac{154 X 7}{4 X 22} = \frac{49}{4}$

r = $\frac{7}{2}$ = 3.5cm

58. Surface area of a football = 100**π** cm^2

4 **π** r^2 = 100 **π**⇒ r = 5cm

The Volume of air inside the football is = $\frac{4}{3}$**π** r^3

V = $\frac{4}{3}$ x $\frac{22}{7}$ x 5^3 = 523.8 cm^3

59. r = 2.8m

Volume of hemispherical tank = $\frac{2}{3}$**π** r^3

V= $\frac{2}{3}$x$\frac{22}{7}$x $(2.8)^3$ = 45.99m^3 = 45.99 x 1000 litre = 45,990 litre

60. $\frac{volume\ of\ sphere\ 1}{Volume\ of\ sphe\quad 2} = \frac{\frac{4}{3}\pi r_1^3}{\frac{4}{3}\pi r_2^3} = \frac{64}{27}$

$\left(\frac{r_1}{r_2}\right)^3 = \left(\frac{4}{3}\right)^3$

$\frac{r_1}{r_2} = \frac{4}{3}$

$\frac{surface\ area\ of\ sphere\ 1}{surface\ area\ of\ spher\ \ 2} = \frac{4\,\pi\, r_1^2}{4\,\pi\, r_2^2} = \left(\frac{4}{3}\right)^2 = \frac{16}{9}$

The ratio of their surface areas is = 16 : 9

61. surface area of a sphere = $144\boldsymbol{\pi}$ m^2

$4\,\boldsymbol{\pi}\, r^2 = 144\,\boldsymbol{\pi}$

$r^2 = 36 \Rightarrow r = 6m$

Volume of the sphere = $\frac{4}{3}\boldsymbol{\pi}\, r^3 = \frac{4}{3} x \frac{22}{7} x\ (6)^3 = 905.14\ m^3$

62. CSA of a solid hemispherical = 1232 cm^2

$2\,\boldsymbol{\pi}\, r^2 = 1232$

$r^2 = 196 \Rightarrow r = 14$ cm

IV. Three marks questions

63.l=$\sqrt{h^2 + r^2}$ = $\sqrt{16^2 + 12^2}$ = 20cm

LSA= πrl= 3.14 X12X20= 753.6 cm^2

TSA= πr (r+l) = 3.14 X12(12+20) = 1205.76 cm^2

64. Diameter of the base of the cone = 9cm ⇒ radius, r = $\frac{9}{2}$cm

Height, h = 9cm

Volume = $\frac{1}{3}\boldsymbol{\pi} r^2 h = \frac{1}{3} x \frac{22}{7} x \left(\frac{9}{2}\right)^2 x\ 9 = 190.9\ cm^3$

The volume of the largest right circular cone that can be cut out of a cube whose edge is 9cm is 190.9cm^3

65.Given the radius and height of a right circular cone are in the ratio 3 : 4 ⇒ r:h=3 : 4

Let r = 3p and h = 4p

Volume of the cone = 301.44 cm^3

$\frac{1}{3}\boldsymbol{\pi} r^2 h = 301.44 \Rightarrow \frac{1}{3}$ x 3.14 x $(3p)^2$ x 4p = 301.44

$\Rightarrow p^3 = 8 \Rightarrow p = 2$

r = 3p = 3(2) = 6cm

h = 4p = 4(2) = 8cm

l = $\sqrt{h^2 + r^2}$= $\sqrt{8^2 + 6^2}$ = 10cm

The slant height of cone is 10cm

66. h = 16cm, d = 24cm ⇒ r = 12 cm

$l = \sqrt{h^2 + r^2} = \sqrt{16^2 + 12^2}$ = 20cm

$\frac{CSA}{TSA} = \frac{\pi rl}{\pi r(r+l)} = \frac{20}{(12+20)} = \frac{5}{8}$ The ratio of curved surface area to the total surface area is 5: 8

67. LSA of Hemisphere= $2\pi r^2$, r= $\frac{10.25}{2}$

$= 2x\frac{22}{7}x\frac{10.25}{2}x\frac{10.25}{2}$ = 173.25 cm^2

cost of tin plating at the rate of Rs 16 per 100 cm^2 is= $\frac{173.25}{100}$x16 = 27.72 Rs

68. Radius of laddoo, R = 5cm

Volume of laddoo, $V_1 = \frac{4}{3}\pi R^3$

$V = \frac{4}{3} x \frac{22}{7} x 5^3$ = 523.8 cm^3

Radius of laddoo, r = 2. 5cm

Volume of laddoo, $V_2 = \frac{4}{3}\pi r^3$

$V = \frac{4}{3} x \frac{22}{7} x (2.5)^3$ = 65.47 cm^3

The Number of laddoos can be made = $\frac{523.8}{65.47} \approx$ 8 laddoos

69. Area of the base of conical tent = 11 x $4m^2$ = $44m^2$

Volume of the conical tent = 11 x 20 = 220 m^3

$\frac{1}{3}\pi r^2 h = 220$

$\frac{1}{3}(44)$ h = 220 ⇒ h = 15m

The height of the conical tent is 15m

70. Volume of the solid= Volume of cone + Volume of hemisphere

$= \frac{\pi r^2 h}{3} + \frac{2\pi r^3}{3}$

$= \frac{\pi r2}{3}(h+r) = \frac{\pi (1)2}{3}(1+2(1))$

$= \frac{\pi}{3}(3) = \pi$ cm^3

V. Four marks questions

71. d= 10.5 cm, r= $\frac{10.5}{2}$ m, h= 3m

Volume of cone= $\frac{\pi r^2 h}{3} = \frac{22\ 10.5X10.5X10.5X3}{7X3X2X2X2}$ = 86.625 m^3

$l = \sqrt{h^2 + r^2} = \sqrt{3^2 + 5.25^2}$ = 6.05 cm (Aprox)

Area 0f canvas= LSA of cone = π r l = πrl= $\frac{22}{7}$x5.25x 6.05 =99.825 m^2

72. $l = \sqrt{h^2 + r^2} = \sqrt{20^2 + 2.1^2}$ = 20.11 cm

LSA of corn cob= πrl= $\frac{22}{7}$x2.1x 20.11 =132.73 cm^2 (aprox)

No. of grains on cob of the surface of the corn cob =4

Therefore no. of grains on the entire curved surface of the cob = 132.73 x4 = 530.92 = 531 (Approx)

73. Let the diameter of the sphere bed.

Radius $r_1 = \frac{d}{2}$

Diameter of sphere is decreased by 25%

Radius $r_2 = \frac{d}{2}(1 - \frac{25}{100}) = \frac{3}{8}$ d

CSA of sphere, $S_1 = 4\,\pi r_1^2 = 4\,\pi \left(\frac{d}{2}\right)^2 = \boldsymbol{\pi} d^2$

CSA of sphere when radius decreased, $S_2 = 4\,\pi r_2^2 = 4\,\pi \left(\frac{3d}{8}\right)^2 = \frac{9}{16}\boldsymbol{\pi} d^2$

Decrease in surface area, $S_1 - S_2 = \boldsymbol{\pi} d^2 - \frac{9}{16}\boldsymbol{\pi} d^2 = \frac{7}{16}\boldsymbol{\pi} d^2$

Percentage of decrease in the surface area of the sphere is

$= \frac{S_1 - S_2}{S_1}$ x 100

$= \frac{7\pi d^2}{16\pi d^2}$ x 100 = $\frac{7}{16}$ x 100 = 43.75%

74. Volume of old sphere= $\frac{4}{3}\pi r^3 = \frac{4}{3} \text{x} \frac{22}{7} r^3 = \frac{88}{21} r^3$

Volume of 27 old spheres= 27x$\frac{88}{21} r^3$

(i) radius of new sphere =r'

Volume of new sphere = = $\frac{4}{3}\pi(r')^3 = \frac{4}{3} \text{x} \frac{22}{7}(r')^3 = \frac{88}{21}(r')^3$

$\frac{88}{21}(r')^3 = 27\text{x}\frac{88}{21} r^3$

r' = 3r

(ii) S= $4\,\pi r^2$

S' = $4\,\pi(r')^2 = 4\,\pi(3r)^2 = 36\,\pi r^2$

S :S' = $4\,\pi r^2$: $36\,\pi r^2$ = 1:

CHAPTER-12 STATISTICS

I. Multiple choice questions

1. A) Bar graph

2. D) VI and IX

3. B) Frequency

4. B) Frequency

5. B) Continuous data

6. A) 10

7. B) 15

8. B) 20 – 30

9. A) 15 – 20

10. C) 15

11. D) Frequency polygon

12. C) 4

13. D) $\frac{\text{Upper limit + lower limit}}{2}$

II. One marks questions

14. Bar Graph: The graphical representation of data using rectangular bars with equal gaps between them.

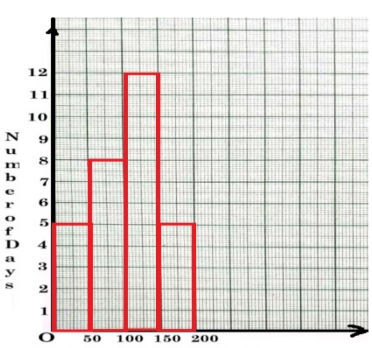
15. Class mark of 10 – 20 is 15 ($\frac{(10+20)}{2}$= 15)

16. Bar Graph

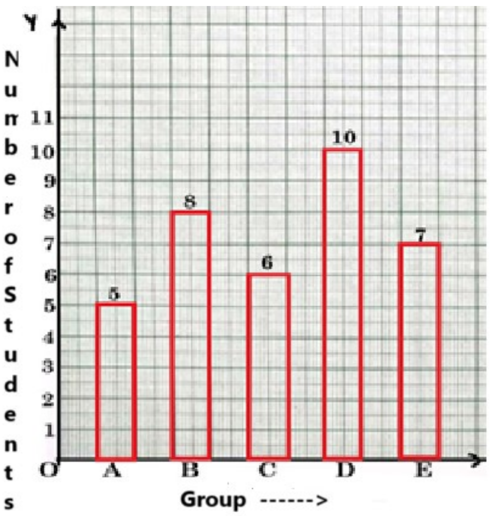
17. Frequency Polygon

III. Two marks questions

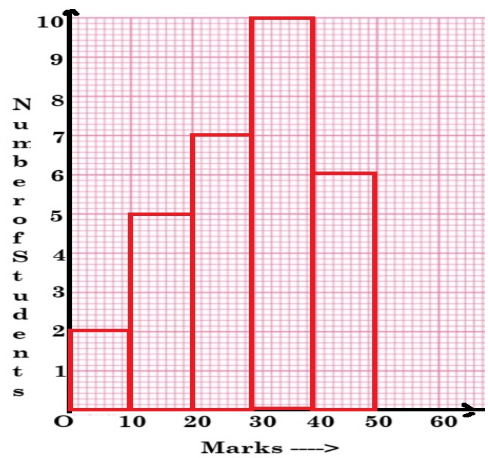
18.



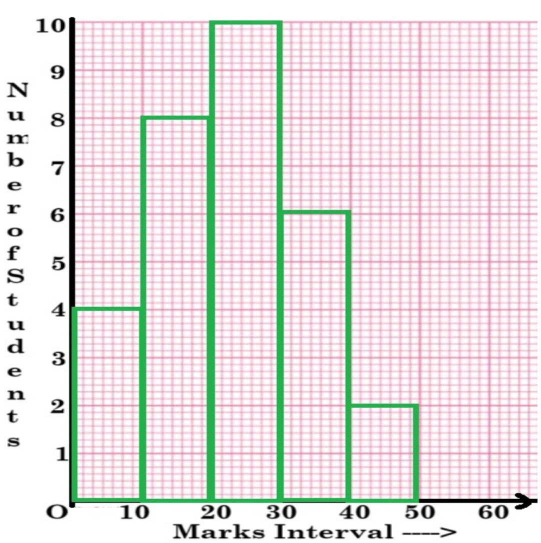
19.


Y
Number of Students
Category
O
A
B
C
D
E
Group ------>
5
8
6
10
7

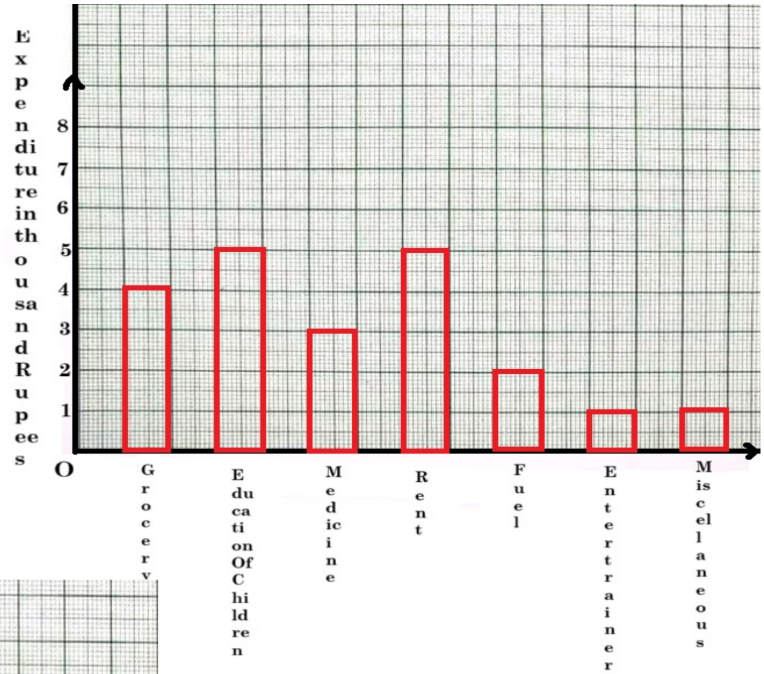
20.


Number of Students
O
10
20
30
40
50
60
Marks ---->

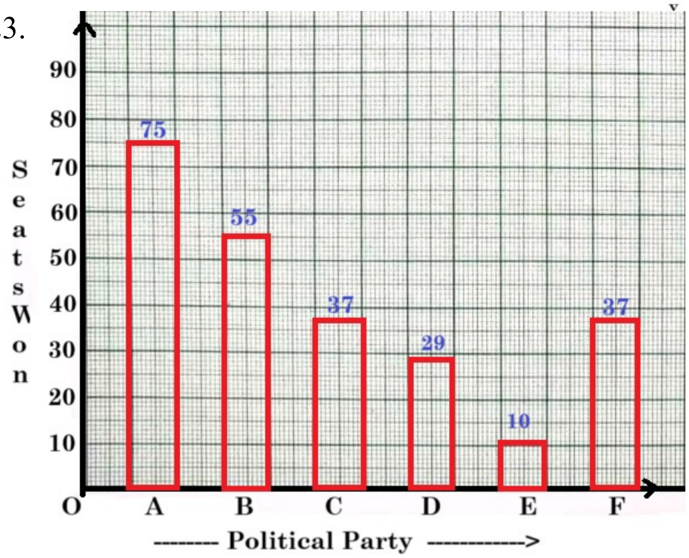
21.


Number of Students
O
10
20
30
40
50
60
Marks Interval ---->

22.



23.



24.

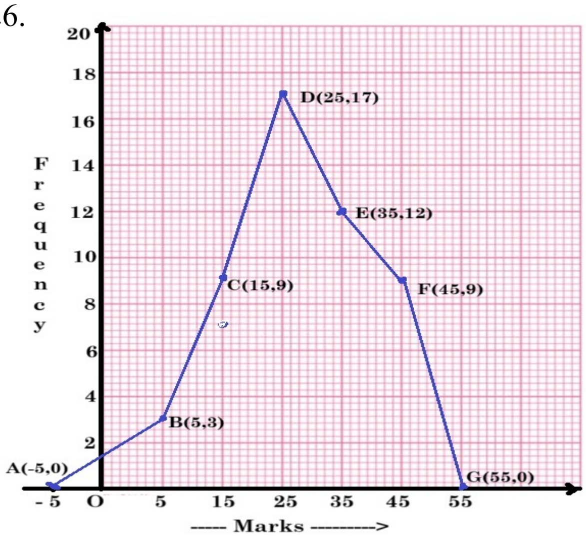
Bar Graph	Histogram
Bars are separated	Columns are adjacent or no gap
Each bar represents a group or category.	Each bar represents a class interval or range of values.
Bars can be arranged in any order.	Columns are arranged in increasing or decreasing order.

25. Frequency polygon: A graphical representation o a frequency distribution by connecting the mid points of each class interval & their respective frequencies with straight lines.

A Frequency polygon graph is a curve that is depicted by a line segment, whereas Histogram depicts data through rectangular shaped bars with no spaces between them.

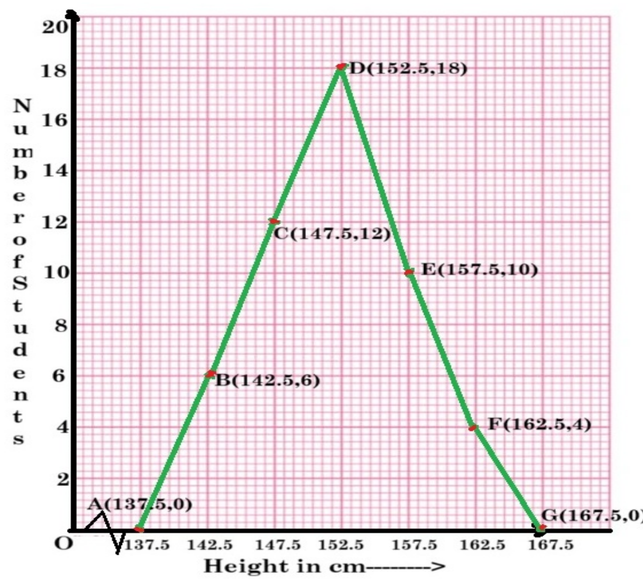
IV. Three marks questions

26.

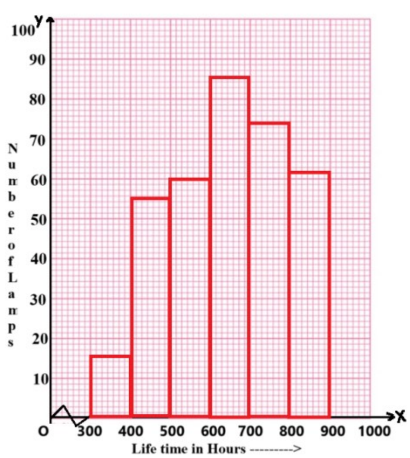


27.

CI	MIDPOINT	F
140-145	142.5	6
145-150	147.5	12
150-155	152.5	18
155-160	157.5	10
160-165	162.5	4



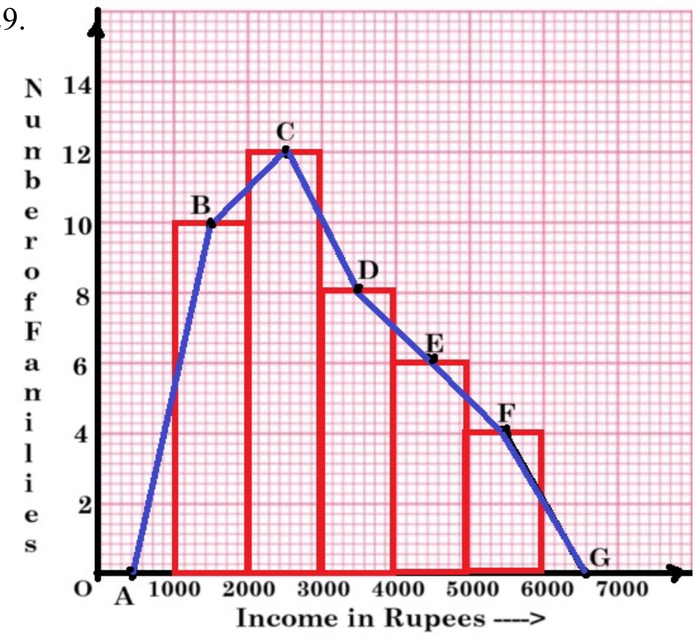
28. i.



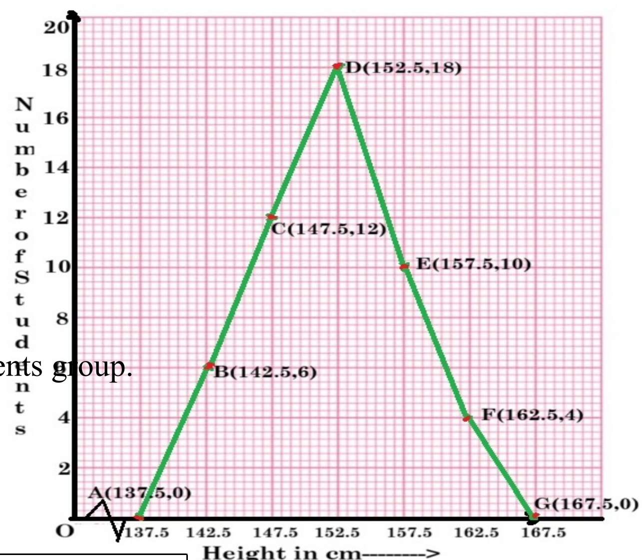
ii. 74+62+48=184 lamps have a lifetime of more than 700 hours.

V. Four marks questions

29.



30.



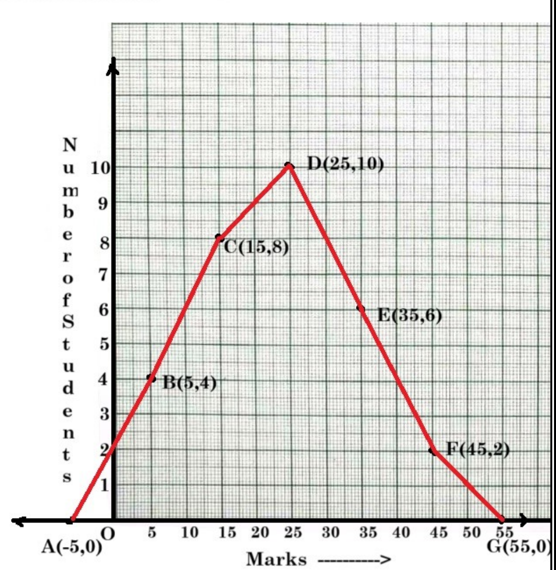
a) Most students are of the average height around 150 – 155cm.

b) Few students are either very short (140 – 145 cm) or tall (160 – 165 cm).

c) Normal distribution of height in the students group.

31.

C I	MID POINT	FREQUENCY
0 - 10	5	4
10 - 20	15	8
20 - 30	25	10
30 - 40	35	6
40 - 50	45	2



32. a) 25 students score more than 40 marks.

b) 4 students score 60 to 80 marks.

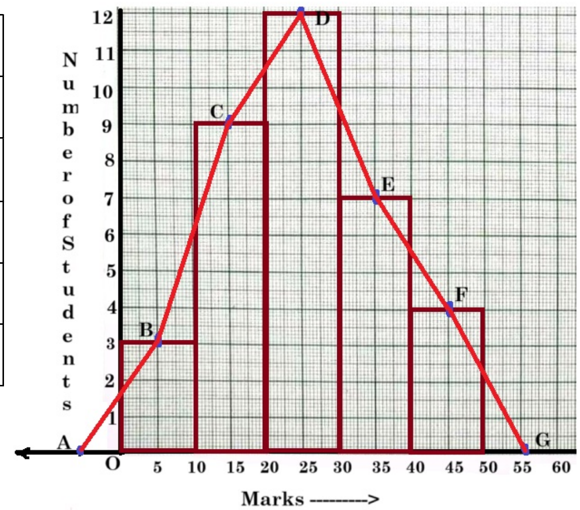
c) 9 students score more than 90 marks.

d) 24 students are NC.

VI. Five marks questions

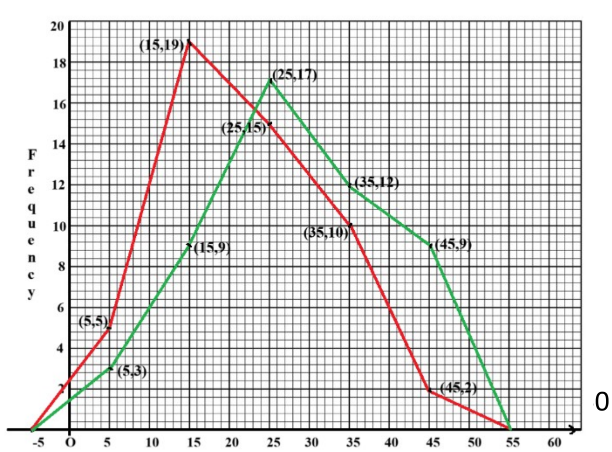
33.

C I	MID POINT	FREQUENCY
0 - 10	5	3
10 - 20	15	9
20 - 30	25	12
30 - 40	35	7
40 - 50	45	4



34.

MARKS	CLASS MARKS(MID POINT)	SECTION *A* FREQUENCY	SECTION *B* FREQUENCY
0 - 10	5	3	5
10 - 20	15	9	19
20 - 30	25	17	15
30 – 40	35	12	10
40 - 50	45	9	1



The peak of section "A" is at a higher range than section "B", therefore Section "A" performed better than section "B".

35.

MARKS	FREQUENCY	WIDTH OF CLASS	LENGTH OF RECTANGLE
10 – 20	6	10	$\frac{6}{10}$X 10 = 6
20 – 30	17	10	$\frac{17}{10}$X 10 = 17
30 – 40	15	20	$\frac{15}{20}$X 10 = 7.5
40 – 50	16	20	$\frac{16}{20}$X 10 = 8
50 - 60	26	30	$\frac{26}{30}$X 10 = 8.66

